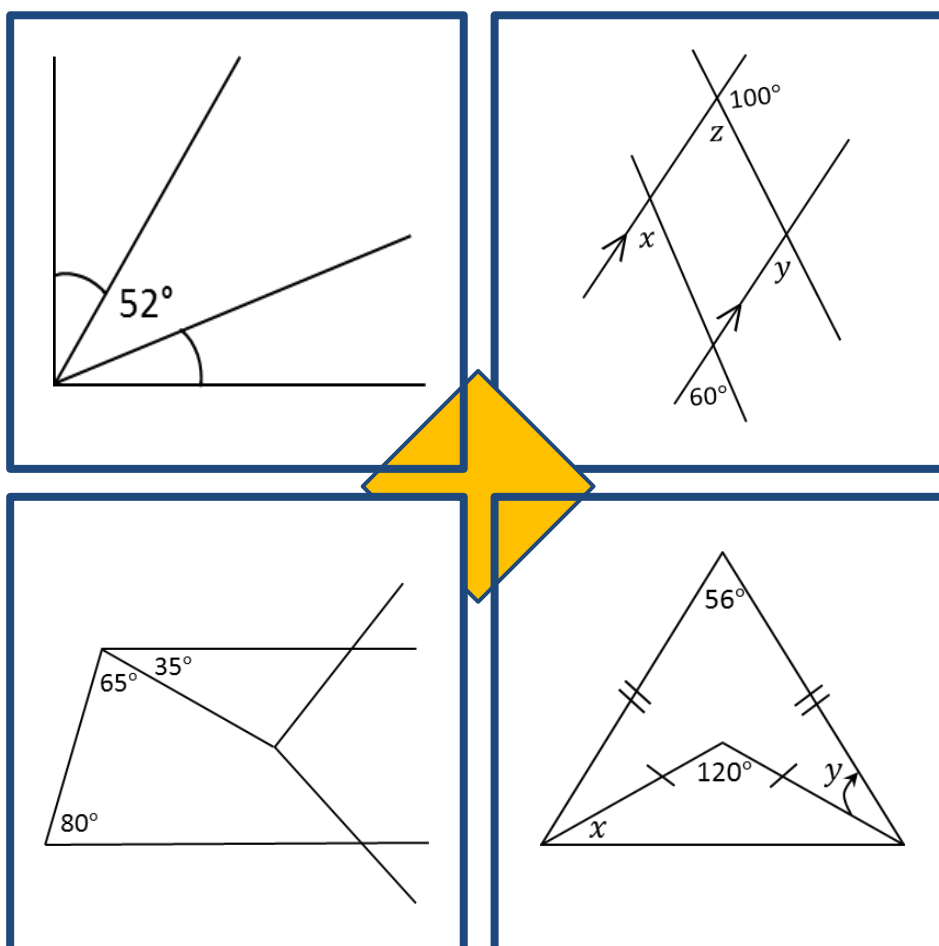


#TRY-angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

VERSION 1.0



#TRY–angles: Practice in solving geometry problems

These materials were produced by the Wits Maths Connect Secondary (WMCS) project at the University of the Witwatersrand.

Visit us at www.witsmathsconnectsecondary.co.za

Team members:

Craig Pournara (Project leader)

Micky Lavery, Wanda Masondo, Yvonne Sanders and Fatou Sey

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#TRY-angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

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About this booklet

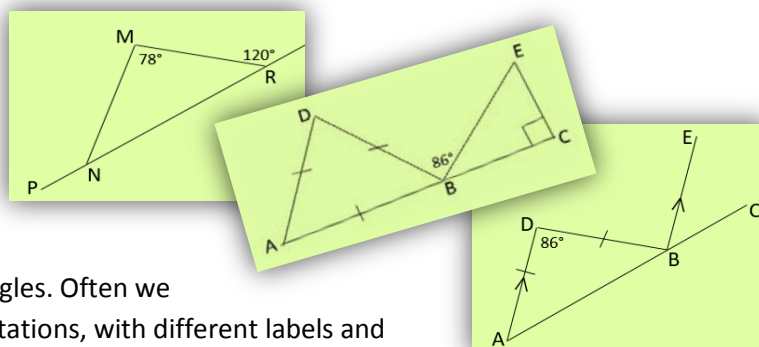
The 22 worksheets in this booklet provide practice in solving simple geometry problems (or riders). They focus on Grade 8 geometry content and include solutions for each question.

The pack is called **#TRY-angles** because we know that geometry is difficult to learn and to teach. Nevertheless, we challenge everyone to *try*!! However, it's difficult to convince learners to try if the riders are too difficult from the outset. Our worksheets begin with examples that require only single statements to determine the answer. From there, we build to examples requiring two statements and then more. All riders involve numeric calculations of angles only.

We assume learners have been taught the content so that they can use these worksheets to practise. We do, however, provide a 2-page summary of the basics of angles, lines and triangles. The summary includes definitions and theorems but we don't emphasise the difference between the two. We also include the accepted abbreviations of geometry reasons distributed by the Department of Basic Education. While we are concerned that too much emphasis is being placed on formal geometric reasoning in Grades 8 and 9, we provide reasons in all our solutions to assist the teacher.

Worksheets begin with simple recall or knowledge tasks which direct learners to the properties or theorems that form the focus of the worksheet.

Riders begin with simple diagrams and gradually include more lines and angles. Often we use the same diagram in different orientations, with different labels and slight adaptations of the features as shown alongside. This will help learners to develop confidence in making sense of geometry diagrams and hence to cope with more complex diagrams in higher grades.



The worksheets are arranged in 3 sections with each worksheet in a section being slightly more difficult than the previous one and/or focusing on a different aspect.

| Section | #wksts | Content |
|---------|--------|--|
| 1 | 8 | Simple riders involving right angles, angles on straight lines, angles around a point and vertically opposite angles |
| 2 | 6 | Angles formed when parallel lines are cut by a transversal, including "converses" and the content of section 1 |
| 3 | 8 | Properties of triangles with several worksheets that include parallel lines |

This pack does not include the Theorem of Pythagoras, similarity or congruence.

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS



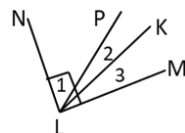
In geometry we need to give reasons for the statements we make about lines, angles and shapes.

There are specific reasons and specific abbreviations which you can use in tests and exams. We are introducing them in Grade 8 so that you can begin to learn them.

LINES AND ANGLES

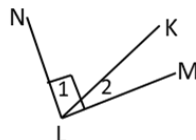
Two or more **adjacent angles in a right angle** add up to 90° .

$$\hat{L}_1 + \hat{L}_2 + \hat{L}_3 = 90^\circ \quad \text{NLM is a right } \angle$$

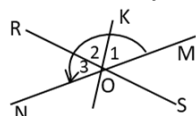


TWO adjacent **angles in a right angle** are complementary.

$$\hat{L}_1 + \hat{L}_2 = 90^\circ \quad \text{complementary } \angle s$$



Two or more **adjacent angles on a straight line** add up to 180° .



$$K\hat{O}M + K\hat{O}R + R\hat{O}N = 180^\circ \quad \angle s \text{ on a str line}$$

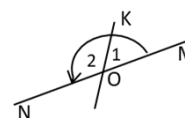
OR $\hat{O}_1 + \hat{O}_2 + \hat{O}_3 = 180^\circ \quad \angle s \text{ on a str line}$

We are given: a line NM and adjacent angles.

TWO adjacent **angles on a straight line** are supplementary.

$$K\hat{O}M + K\hat{O}N = 180^\circ$$

OR $\hat{O}_1 + \hat{O}_2 = 180^\circ \quad \angle s \text{ on a str line}$

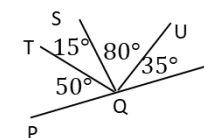


If two or more **adjacent angles add up to 180°** , the outer arms of these angles form a straight line.

$$50^\circ + 15^\circ + 80^\circ + 35^\circ = 180^\circ$$

\therefore PQR is a straight line $\quad \text{adj } \angle s \text{ supp}$

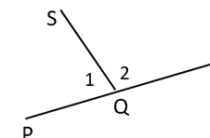
We are given adjacent angles that add up to 180° . This is the opposite (or converse) of $\angle s$ on a str line.



If TWO **adjacent angles are supplementary**, the outer arms of these two angles form a straight line.

$$\hat{Q}_1 + \hat{Q}_2 = 180^\circ \quad \text{given}$$

\therefore PQR is a straight line $\quad \text{adj } \angle s \text{ supp}$

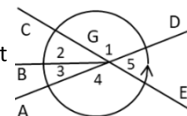


The **adjacent angles in a revolution** add up to 360° .

OR The **angles around a point** form a full turn which is 360° .

$$\hat{G}_1 + \hat{G}_2 + \hat{G}_3 + \hat{G}_4 + \hat{G}_5 = 360^\circ \quad \angle s \text{ in a rev}$$

OR $\angle s$ round a pt

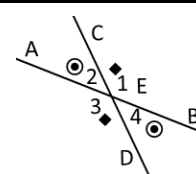


Vertically opposite angles are equal.

$$\hat{E}_1 = \hat{E}_3 \quad \text{vert opp } \angle s$$

AND

$$\hat{E}_2 = \hat{E}_4 \quad \text{vert opp } \angle s$$



NOTE: These angles are **opposite** each other.

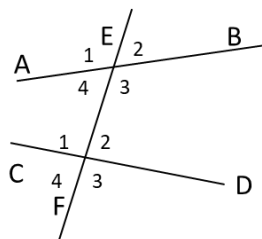
They are not necessarily in a vertical orientation.

NOTE

- Complementary angles add up to 90° .
- Supplementary angles add up to 180° .
- The terms *complementary* and *supplementary* apply to the sum of **two** angles only.

ANGLES FORMED WHEN LINES ARE CUT BY TRANSVERSALS

When 2 lines are cut by a transversal, three important pairs of angles are formed:



Pairs of corresponding angles:

$$\hat{E}_1 \text{ and } \hat{F}_1$$

$$\hat{E}_2 \text{ and } \hat{F}_2$$

$$\hat{E}_3 \text{ and } \hat{F}_3$$

$$\hat{E}_4 \text{ and } \hat{F}_4$$

Pairs of alternate angles:

$$\hat{E}_4 \text{ and } \hat{F}_2$$

$$\hat{E}_3 \text{ and } \hat{F}_1$$

Pairs of co-interior angles:

$$\hat{E}_4 \text{ and } \hat{F}_1$$

$$\hat{E}_3 \text{ and } \hat{F}_2$$

NOTE

- AB and CD are not parallel
- If 3 lines are cut by a transversal then the corresponding and alternate angles occur in threes (not pairs). The co-interior angles occur in 4 pairs.

PARALLEL LINES CUT BY A TRANSVERSAL

When *parallel* lines are cut by a transversal, these pairs of angles have special relationships.

- Pairs of corresponding $\angle s$ are *equal*
- Pairs of alternate $\angle s$ are *equal*
- Pairs of co-interior $\angle s$ are *supplementary*

See next page for more details

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS



| GIVEN: Parallel lines cut by transversals | | GIVEN: Equal corresponding \angle s, equal alternate \angle s and supplementary co-interior \angle s | |
|---|--|--|--|
| <p>If $AB \parallel CD$, then the corresponding angles are equal</p> <p> $\hat{E}_1 = \hat{F}_1$ AND $\hat{E}_2 = \hat{F}_2$ AND $\hat{E}_3 = \hat{F}_3$ AND $\hat{E}_4 = \hat{F}_4$ corresp \angles, $AB \parallel CD$ </p> | | <p>If the corresponding angles are equal, then the lines are parallel.</p> <p> $\hat{E}_1 = \hat{F}_1$ given $\therefore AB \parallel CD$ corresp \angles = </p> | |
| <p>If $AB \parallel CD$, then the alternate angles are equal.</p> <p> $\hat{E}_4 = \hat{F}_2$ alt \angles, $AB \parallel CD$ AND $\hat{E}_3 = \hat{F}_1$ alt \angles, $AB \parallel CD$ </p> | | <p>If the alternate angles are equal, then the lines are parallel.</p> <p> $\hat{E}_4 = \hat{F}_2$ given $\therefore AB \parallel CD$ alt \angles = </p> | |
| <p>If $AB \parallel CD$, then the co-interior angles are supplementary (i.e. add up to 180°)</p> <p> $\hat{E}_4 + \hat{F}_1 = 180^\circ$ co-int \angles, $AB \parallel CD$ AND $\hat{E}_3 + \hat{F}_2 = 180^\circ$ co-int \angles, $AB \parallel CD$ </p> | | <p>If the co-interior angles are supplementary, then the lines are parallel.</p> <p> $\hat{E}_3 + \hat{F}_2 = 180^\circ$ given $\therefore AB \parallel CD$ co-int \angles sup </p> | |
| TRIANGLES | | | |
| <p>The interior angles of a triangle add up to 180°.</p> <p> $\hat{P} + \hat{Q} + \hat{R} = 180^\circ$ int \angles Δ OR sum of \angles in Δ OR \angle sum in Δ </p> <p>We don't say of the angles of a Δ are supplementary because there are 3 \angles.</p> | | <p>The exterior angle of a triangle is equal to the sum of the interior opposite angles.</p> <p> $\hat{L}_1 = \hat{R} + \hat{M}$ ext \angle of Δ </p> | |
| <p>In an isosceles triangle, the angles opposite the equal sides are equal.</p> <p> $PQ = QR$ given $\therefore \hat{R} = \hat{P}$ \angles opp equal sides </p> | | <p>In an isosceles triangle, the sides opposite the equal angles are equal.</p> <p> $\hat{R} = \hat{P}$ given $\therefore PQ = QR$ sides opp equal \angles </p> | |
| <p>In an equilateral triangle, the angles opposite the equal sides are equal.</p> <p> $\hat{A} = \hat{B} = \hat{C} = 60^\circ$ given $\therefore BC = AC = AB$ sides opp equal \angles </p> | | <p>In an equilateral triangle, the sides opposite the equal angles are equal.</p> <p> $BC = AC = AB$ given $\therefore \hat{A} = \hat{B} = \hat{C} = 60^\circ$ \angles opp equal sides </p> | |

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

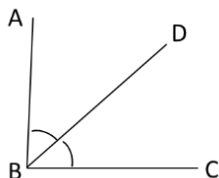
Worksheet 1.1

This worksheet focuses on right angles.

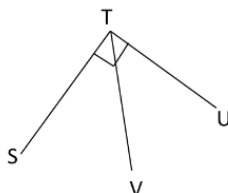
1) Complete: The size of a right angle is ____

2) Which of the following diagrams indicates a right angle?

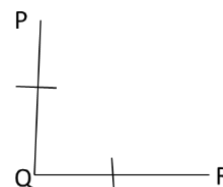
A.



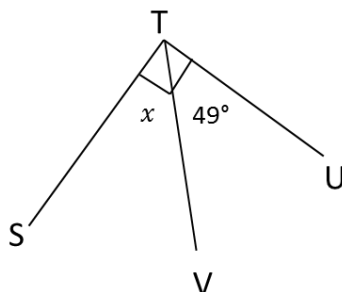
B.



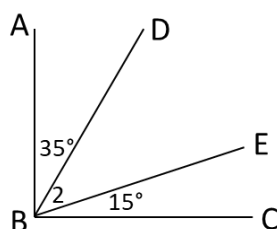
C.



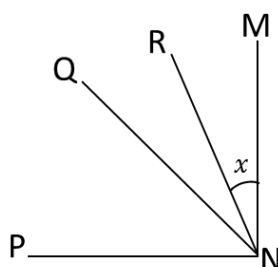
3) If $\widehat{STU} = 90^\circ$, determine x .



4) If $\widehat{ABC} = 90^\circ$, determine \widehat{B}_2 .



5) Given: $\widehat{MNP} = 90^\circ$. \widehat{RNQ} is double \widehat{MNR} . \widehat{QNP} is triple \widehat{MNR} .



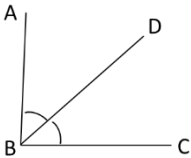
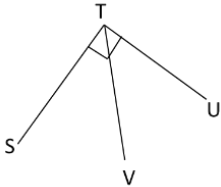
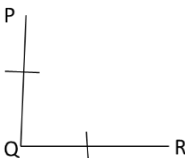
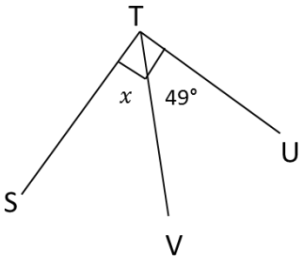
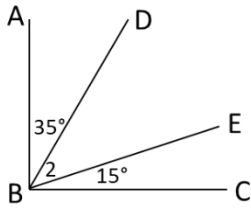
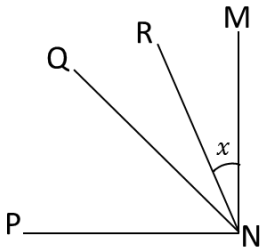
- Determine the value of x .
- Determine the size of \widehat{QNP} .

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 1.1

Answers

| Questions | Answers |
|--|---|
| 1) Complete: The size of a right angle is ____ | 1) 90° |
| 2) Which of the following is a right angle? A)  B)  C)  | 2) B |
| 3) If $\widehat{STU} = 90^\circ$, determine  | 3) $x + 49^\circ = 90^\circ$ right \angle $x = 41^\circ$ |
| 4) If $\widehat{ABC} = 90^\circ$, determine \widehat{B}_2  | 4) $35^\circ + \widehat{B}_2 + 15^\circ = 90^\circ$ right \angle $x = 40^\circ$ |
| 5) Given: $\widehat{MNP} = 90^\circ$. \widehat{RNQ} is double \widehat{MNR} . \widehat{QNP} is triple \widehat{MNR} .  a) Determine the value of x . b) Determine the size of \widehat{QNP} . | 5) $\widehat{MNR} = x$, then $\widehat{RNQ} = 2x$ and $\widehat{QNP} = 3x$. a) If $x + 2x + 3x = 90^\circ$ right \angle $6x = 90^\circ$ $x = 15^\circ$ b) $\widehat{QNP} = 3(15^\circ)$ $= 45^\circ$ |

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 1.2

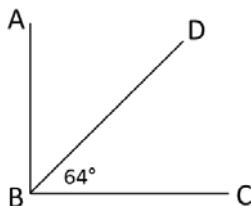
This worksheet focuses on right angles

Questions

1) Complete: Complementary angles add up to ____

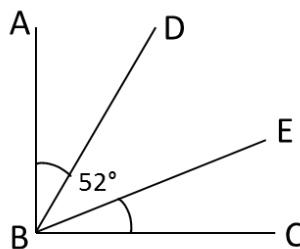
2) Given: $\hat{ABC} = 90^\circ$.

Determine the size of \hat{ABD} .



3) Given: $\hat{ABC} = 90^\circ$.

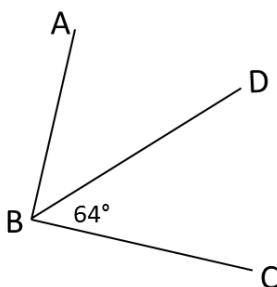
Determine the sizes of \hat{ABD} and \hat{CBE} .



\hat{ABD} , \hat{DBE} , and \hat{CBE} are not called complementary angles. Why?

4) If $\hat{ABC} > 90^\circ$, which statement about \hat{ABD} is definitely true:

- A. $\hat{ABD} = 26^\circ$
- B. $\hat{ABD} = 27^\circ$
- C. $\hat{ABD} > 26^\circ$
- D. $\hat{ABD} < 26^\circ$

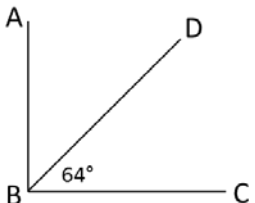
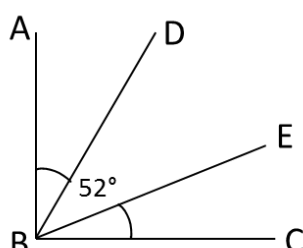
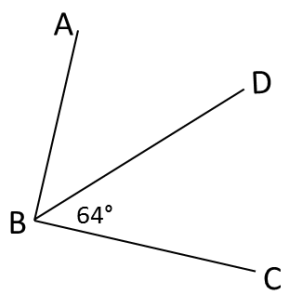


#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 1.2

Answers

| Questions | Answers |
|---|--|
| 1) Complete: Complementary angles add up to ____ | 1) 90° |
| 2) Given: $\hat{A}BC = 90^\circ$ Determine the size of $\hat{A}BD$.  | 2) $\hat{A}BD + 64^\circ = 90^\circ$ given $\hat{A}BD = 26^\circ$ |
| 3) Given: $\hat{A}BC = 90^\circ$. Determine the sizes of $\hat{A}BD$ and $\hat{C}BE$.  | 3) $\hat{A}BD + 52^\circ + \hat{E}BC = 90^\circ$ given $\hat{A}BD = \hat{E}BC$ given $2\hat{A}BD = 38^\circ$ OR $2\hat{E}BC = 38^\circ$ $\hat{A}BD = \hat{E}BC = 19^\circ$ They are not complementary angles because there are 3 angles that add up to 90° |
| 4) If $\hat{A}BC > 90^\circ$, which statement about $\hat{A}BD$ is definitely true: A. $\hat{A}BD = 26^\circ$ B. $\hat{A}BD = 27^\circ$ C. $\hat{A}BD > 26^\circ$ D. $\hat{A}BD < 26^\circ$  | 4) C is definitely true. It is possible that $\hat{A}BD = 27^\circ$ because then $\hat{A}BC > 90^\circ$. However, $\hat{A}BD$ could also be 28° or 29° etc. In fact, if $\hat{A}BC = 26,1^\circ$ then $\hat{A}BC = 90,1^\circ$ which is greater than 90° . This means only C is <u>definitely</u> true. |

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

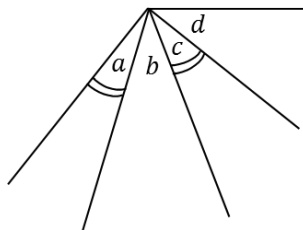
Worksheet 1.3

This worksheet focuses on right angles

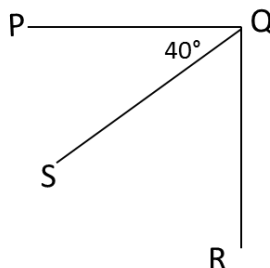
Questions

1) How many degrees in a right angle?

2) Which angles are equal in the diagram below?

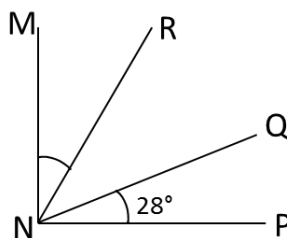


3) Given: $P\hat{Q}R = 90^\circ$
Determine the size of $S\hat{Q}R$.

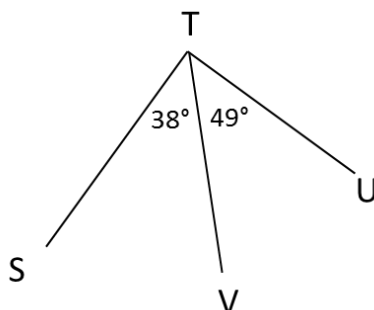


4) $M\hat{N}P$ is a right angle.
Determine the size of:

- a) $M\hat{N}R$
- b) $Q\hat{N}R$
- c) $P\hat{N}R$



5) Is $S\hat{T}U$ a right angle?
If not, what type of angle is it?

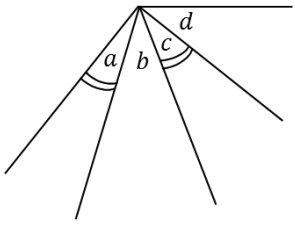
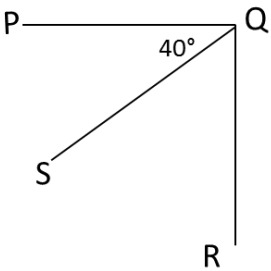
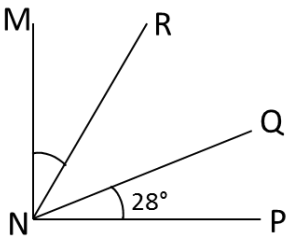
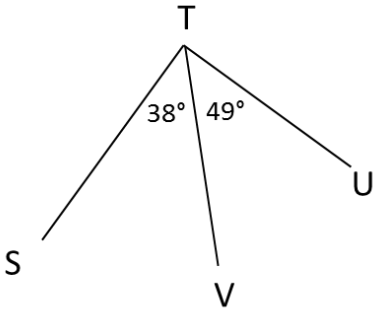


#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 1.3

Answers

| Questions | Answers |
|---|---|
| 1) How many degrees in a right angle? | 1) 90° |
| 2) Which angles are equal in the diagram below?  | 2) a and c are equal because they have the same markings on them |
| 3) Given: $\widehat{PQR} = 90^\circ$ Determine the size of \widehat{SQR} .  | 3) $\widehat{SQR} = 90^\circ - 40^\circ$ $= 50^\circ$ |
| 4) \widehat{MNP} is a right angle. Determine the size of: a) \widehat{MNR} b) \widehat{QNR} c) \widehat{PNR}  | 4) a) $\widehat{MNR} = \widehat{QNP}$ given $= 28^\circ$ b) $\widehat{QNR} = 90^\circ - 2(28^\circ)$ $= 34^\circ$ c) $\widehat{PNR} = 28^\circ + 34^\circ$ $= 62^\circ$ |
| 5) Is \widehat{STU} a right angle? If not, what type of angle is it?  | 5) $\widehat{STU} = 38^\circ + 49^\circ$ $= 87^\circ$ \widehat{STU} is not a right angle \widehat{STU} is an acute angle |

Worksheet 1.4

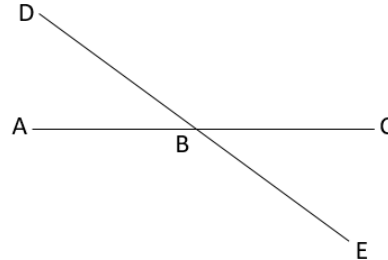
This worksheet focuses on angles around a point, angles on a straight line and vertically opposite angles

Questions

- 1) Line AC intersects line DE at B.

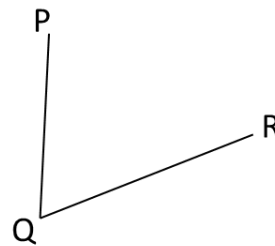
Complete and give reasons for each answer:

- a) $\angle CBE = \underline{\hspace{2cm}}$
 b) $\angle ABE = \underline{\hspace{2cm}}$
 c) $\angle CBE + \angle ABE = \underline{\hspace{2cm}}$



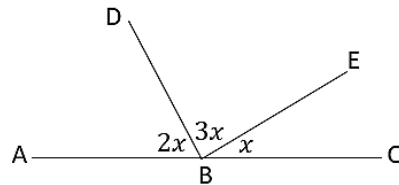
- 2) The diagram shows line segments PQ and QR forming an acute angle and a reflex angle.

- a) Indicate *acute* angle $\angle PQR$ (draw an arc and label it)
 b) Indicate *reflex* angle $\angle PQR$, using a different colour.



- 3) ABC is a straight line.

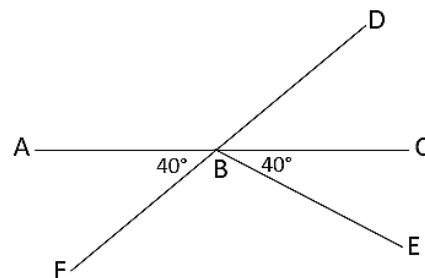
- a) Determine the value of x .
 b) Write down the sizes of the following angles:
 $\angle EBC$; $\angle ABD$; $\angle DBE$
 c) Explain why $\angle EBC$, $\angle ABD$ and $\angle DBE$ are not supplementary angles.



- 4) AC and FD intersect at B.

Determine the sizes of the following, giving reasons:

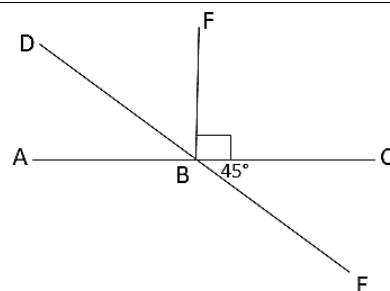
- a) $\angle DBE$
 b) $\angle ABD$
 c) $\angle FBE$



- 5) Consider the diagram below.

Determine the sizes of the following and give reasons:

- a) $\angle DBF$
 b) $\angle ABE$ when it is a reflex angle
 c) $\angle ABE$ when it is an obtuse angle

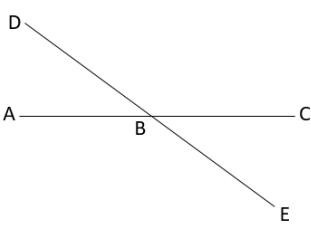
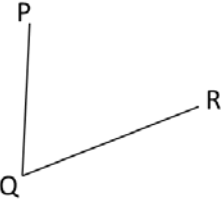
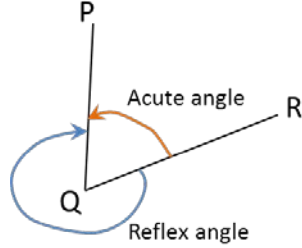
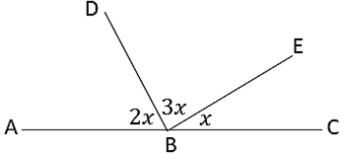
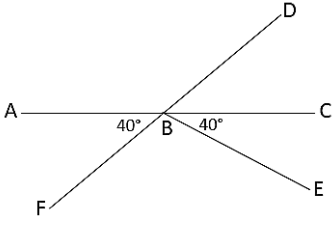
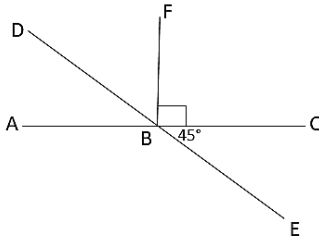


#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 1.4

Answers

| Questions | Answers |
|--|---|
| <p>1) Line AC intersects line DE at B. Complete and give reasons for each answer:</p> <p>a) $\hat{CBE} = \underline{\hspace{2cm}}$</p> <p>b) $\hat{ABE} = \underline{\hspace{2cm}}$</p> <p>c) $\hat{CBE} + \hat{ABE} = \underline{\hspace{2cm}}$</p>  | <p>1)</p> <p>a) \hat{ABD} vert opp \angles</p> <p>b) \hat{DBC} vert opp \angles</p> <p>c) $\hat{CBE} + \hat{ABE} = 180^\circ$ \angles on a str line</p> |
| <p>2) The diagram shows line segments PQ and QR forming an acute angle and a reflex angle.</p> <p>a. Indicate <i>acute</i> angle $P\hat{Q}R$ (draw an arc and label it)</p> <p>b. Indicate <i>reflex</i> angle $P\hat{Q}R$, using a different colour.</p>  | <p>2)</p>  |
| <p>3) ABC is a straight line.</p> <p>a) Determine the value of x.</p> <p>b) Write down the sizes of the following angles: \hat{EBC}; \hat{ABD}; \hat{DBE}</p> <p>c) Explain why \hat{EBC}, \hat{ABD} and \hat{DBE} are not supplementary angles.</p>  | <p>3)</p> <p>a) $2x + 3x + x = 180^\circ$ \angles on a str line $6x = 180^\circ$ $x = 30^\circ$</p> <p>b) $\hat{EBC} = 30^\circ$ $\hat{ABD} = 60^\circ$ $\hat{DBE} = 90^\circ$</p> <p>c) <i>Supplementary</i> refers to only 2 angles that add up to 180°</p> |
| <p>4) AC and FD intersect at B. Determine the sizes of the following, giving reasons:</p> <p>a) \hat{DBE}</p> <p>b) \hat{ABD}</p> <p>c) \hat{FBE}</p>  | <p>4)</p> <p>a) $\hat{DBE} = \hat{DBC} + 40^\circ$ $\hat{DBC} = 40^\circ$ vert opp \angles $\therefore \hat{DBE} = 80^\circ$</p> <p>b) $\hat{ABD} = 180^\circ - \hat{DBC}$ \angles on a str line $= 140^\circ$</p> <p>c) $\hat{FBE} = 140^\circ$ vert opp \angles OR \angles on a str line</p> |
| <p>5) Consider the diagram below. Determine the sizes of the following and give reasons:</p> <p>a) \hat{DBF}</p> <p>b) \hat{ABE} when it is a reflex angle</p> <p>c) \hat{ABE} when it is an obtuse angle</p>  | <p>5)</p> <p>a) $\hat{DBF} = 45^\circ$ \angles on a str line</p> <p>b) $\hat{DBA} = 45^\circ$ \angles on a str line Reflex $\hat{ABE} = \hat{DBA} + 180^\circ$ $= 225^\circ$</p> <p>c) $\hat{ABE} = 360^\circ - 225^\circ$ \angles around a pt $= 135^\circ$</p> |

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 1.5

This worksheet focuses on angles on a straight line

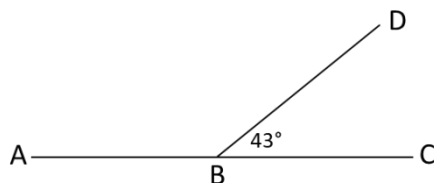
Questions

1) Complete:

The sum of angles on a straight line is ____

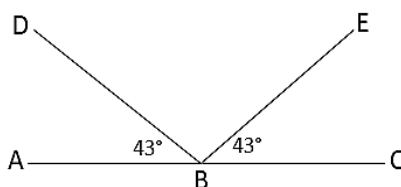
2) ABC is a straight line.

Determine the size of \hat{ABD}



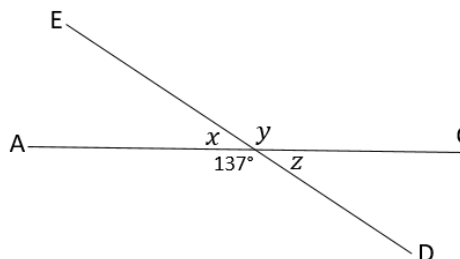
3) ABC is a straight line.

Is \hat{DBE} equal to 90° ? Justify your answer.



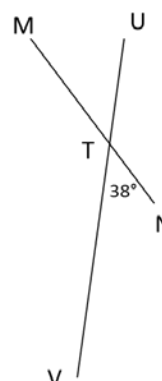
4) Line AC intersects line ED.

Determine x , y and z without using the fact that vertically opposite angles are equal.



5) MN intersects UV at T.

Determine \hat{MTU} , \hat{MTV} and \hat{NTU} without using the fact that angles on a straight line add up to 180° .



#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 1.5

Answers

| Questions | Answers |
|--|---|
| 1) Complete: The sum of angles on a straight line is ____ | 1) 180° |
| 2) ABC is a straight line. Determine the size of \hat{ABD} | 2) $\hat{ABD} + 43^\circ = 180^\circ$ \angle s on a str line $\hat{ABD} = 137^\circ$ |
| 3) ABC is a straight line. Is \hat{DBE} equal to 90° ? Justify your answer. | 3) $\hat{DBE} + 2(43^\circ) = 180^\circ$ \angle s on a str line $\hat{DBE} = 94^\circ$ So, \hat{DBE} is not 90° OR The 43° angles need to be 45° for \hat{DBE} to equal 90° |
| 4) Line AC intersects line ED . Determine x , y and z <u>without using</u> the fact that vertically opposite angles are equal. | 4) $x = 43^\circ$ \angle s on a str line ED $y = 137^\circ$ \angle s on a str line AC $z = 43^\circ$ \angle s on a str line ED or AC |
| 5) MN intersects UV at T . Determine \hat{MTU} , \hat{MTV} and \hat{NTU} <u>without using</u> the fact that angles on a straight line add up to 180° . | 5) $\hat{MTU} = 38^\circ$ vert opp \angle s $\hat{MTV} + \hat{NTU} + 2 \times 38^\circ = 360^\circ$ \angle s around a pt $\hat{MTV} + \hat{NTU} = 284^\circ$ $\hat{MTV} = \hat{NTU}$ vert opp \angle s So, $\hat{MTV} = \hat{NTU} = \frac{284^\circ}{2} = 142^\circ$ |

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 1.6

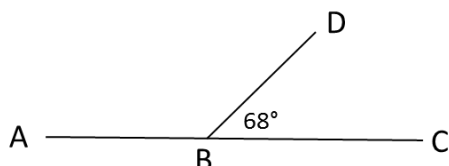
This worksheet focuses on angles on a straight line and includes showing that a straight line is formed

Questions

1) Complete: Adjacent angles on a straight line add up to ____

2) Given: $\hat{A}BC = 180^\circ$

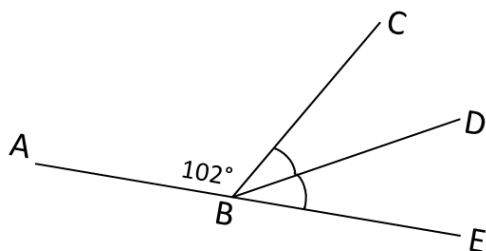
Determine the size of $\hat{A}BD$.



3) Assume that ABE is a straight line.

Determine the size of $\hat{C}BD$ and $\hat{D}BE$.

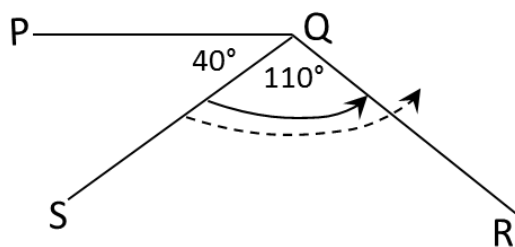
Give reasons for each statement.



4) $\hat{P}QS = 40^\circ$. QR is rotating anticlockwise so that $\hat{S}QR = 110^\circ$.

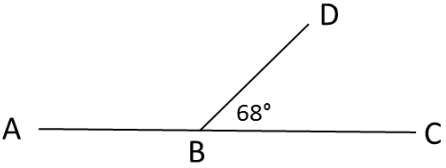
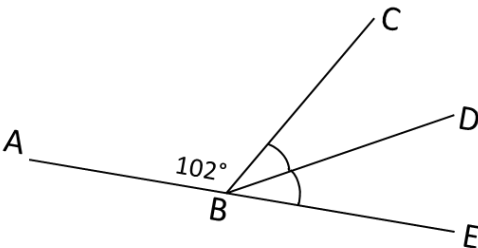
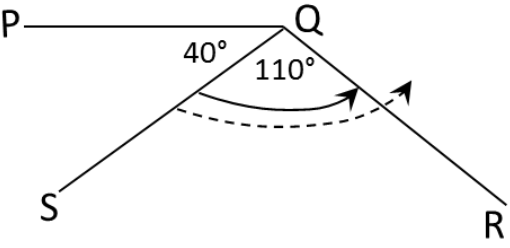
a) How many more degrees must QR rotate so that PQR forms a straight line?

b) When PQR forms a straight line, will the angles be supplementary?



Worksheet 1.6

Answers

| Questions | Answers |
|---|--|
| 1) Complete: Adjacent angles on a straight line add up to _____ | 1) 180° |
| 2) Given: $\angle ABC = 180^\circ$ Determine the size of $\angle ABD$.  | 2) $\angle ABD = 180^\circ - 68^\circ$ $\angle s$ on a str line $= 112^\circ$ |
| 3) Assume that ABE is a straight line. Determine the size of $\angle CBD$ and $\angle DBE$. Give reasons for each statement.  | 3) $\angle CBD = \angle DBE$ given $2(\angle CBD) + 102^\circ = 180^\circ$ $\angle s$ on a str line $2(\angle CBD) = 78^\circ$ $\angle CBD = 39^\circ$ $= \angle DBE$ |
| 4) $\angle PQS = 40^\circ$. QR is rotating anticlockwise so that $\angle SQR = 110^\circ$. How many more degrees must QR rotate so that PQR forms a straight line?  | 4) a) For PQR to be a straight line, $\angle PQR$ must equal 180° . $180^\circ - 40^\circ - 110^\circ = 30^\circ$ QR must rotate by 30° b) Yes, there are 2 angles and they will add up to 180° . |

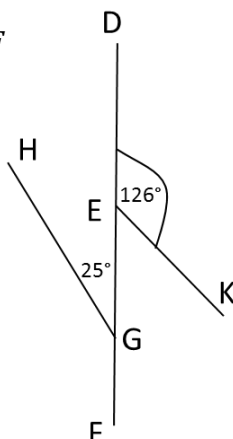
Worksheet 1.7

This worksheet focuses on angles on a straight line and complementary angles

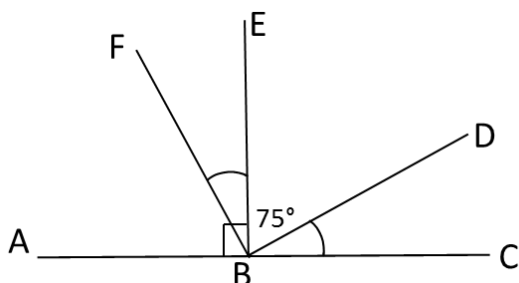
Questions

- 1) True or false:
 - a) Adjacent supplementary angles add up to 360° .
 - b) Complementary angles have a common arm and add up to 90° .

- 2) DEFG is a straight line.
Determine the size of $\angle KEF$ and $\angle HGF$

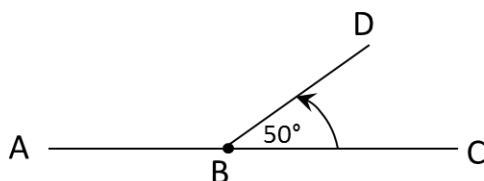


- 3) ABC is a straight line.
 - a) Determine the sizes $\angle CBD$, $\angle EBF$ and $\angle ABF$. Give reasons for each statement.
 - b) Name as many pairs of complementary angles as possible.
 - c) Are there any supplementary angles in the diagram?



- 4) If $\angle ABC < 180^\circ$, which statement about $\angle ABD$ is definitely true:

- A. $\angle ABD = 129^\circ$
- B. $\angle ABD = 130^\circ$
- C. $\angle ABD > 130^\circ$
- D. $\angle ABD < 130^\circ$

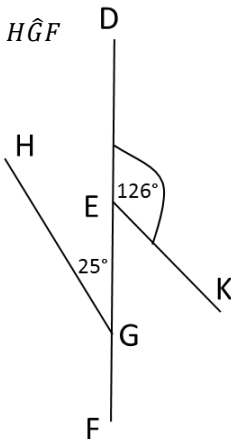
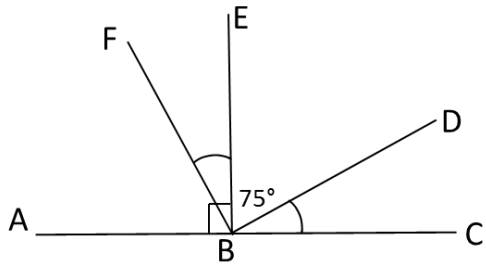
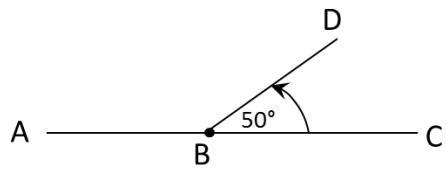


#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 1.7

Answers

| Questions | Answers |
|--|---|
| <p>1) True or false:</p> <p>a) Adjacent supplementary angles add up to 360°.</p> <p>b) Complementary angles have a common arm and add up to 90°.</p> | <p>1)</p> <p>a) False, they total 180°.</p> <p>b) False, they need a common vertex too</p> |
| <p>2) DEGF is a straight line. Determine the size of $K\hat{E}F$ and $H\hat{G}F$</p>  | <p>2)</p> <p>$K\hat{E}F = 54^\circ$ \angles on a str line</p> <p>$H\hat{G}F = 155^\circ$ \angles on a str line</p> |
| <p>3) ABC is a straight line.</p> <p>a) Determine the sizes $C\hat{B}D$, $E\hat{B}F$ and $A\hat{B}F$. Give reasons for each statement.</p> <p>b) Name as many pairs of complementary angles as possible.</p>  | <p>3)</p> <p>a) $E\hat{B}C = 90^\circ$ \angles on a str line</p> <p>$C\hat{B}D = 90^\circ - 75^\circ = 15^\circ$</p> <p>$E\hat{B}F = C\hat{B}D$ given</p> <p>$= 15^\circ$</p> <p>$A\hat{B}F = 90^\circ - 15^\circ = 75^\circ$</p> <p>OR by \angles on a str line</p> <p>b) $A\hat{B}F$ & $E\hat{B}F$; $E\hat{B}F$ & $E\hat{B}D$; $E\hat{B}D$ & $C\hat{B}D$</p> <p>c) There are no pairs of angles that add up to 180°</p> |
| <p>4) If $A\hat{B}C < 180^\circ$, which statement about $A\hat{B}D$ is definitely true:</p> <p>A. $A\hat{B}D = 129^\circ$</p> <p>B. $A\hat{B}D = 130^\circ$</p> <p>C. $A\hat{B}D > 130^\circ$</p> <p>D. $A\hat{B}D < 130^\circ$</p>  | <p>4)</p> <p>D is definitely true.</p> <p>It is possible that $A\hat{B}D = 129^\circ$ because this would make $A\hat{B}C < 180^\circ$. However, $A\hat{B}D$ could also be 128° or 127° etc. So we can't say that A is <u>definitely</u> true.</p> |

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

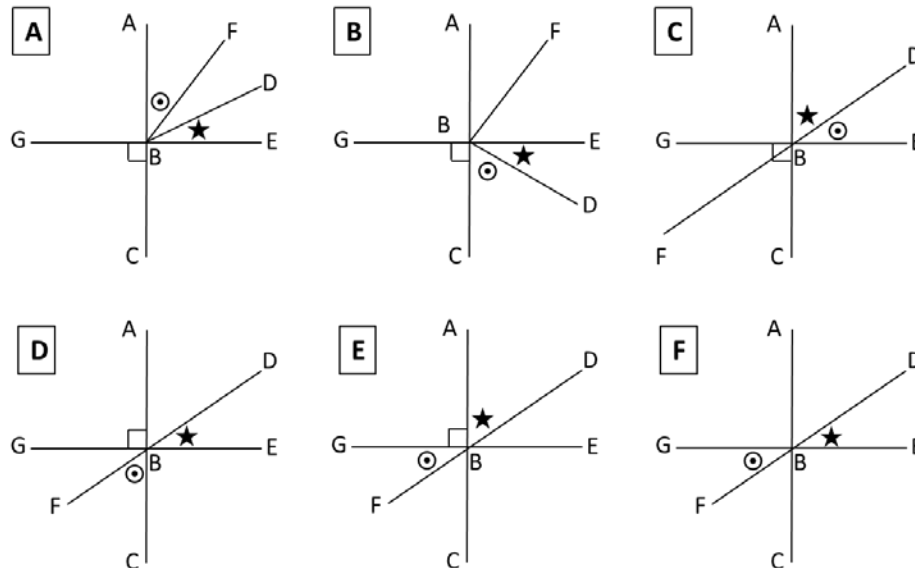
Worksheet 1.8

This worksheet focuses on angles on a straight line, complementary angles and vertically opposite angles

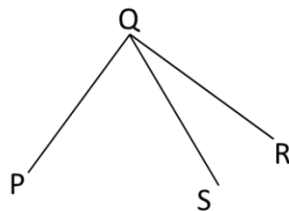
Questions

1) In each diagram below, we have marked 2 angles with symbols ★ and ⊙. Which diagrams show the angle relationships in i – iii? Write the letter of the diagram/s.

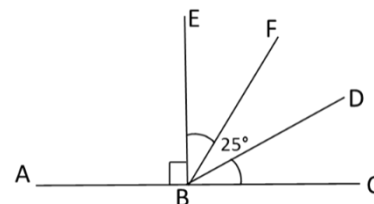
- i) Adjacent complementary angles
- ii) Complementary angles
- iii) Vertically opposite angles



2) $\angle PQS$ and $\angle SQR$ are complementary angles. If $\angle PQS$ is three times the size of $\angle SQR$, what is the size of each angle?



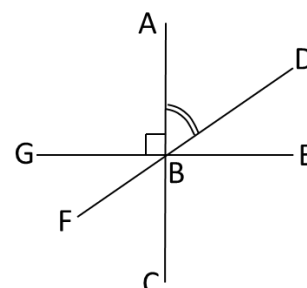
3) What is the size of $\angle ABD$? Give reasons for your answer.



4) $\angle ABD = 50^\circ$. Indicate whether the following statements are TRUE or FALSE.

Support your answers with reasons (and calculations if necessary).

- a) $\angle FBC = 50^\circ$
- b) $\angle GBD = \angle FBE$
- c) $\angle GBE$ is a right angle
- d) $\angle ABD$ and $\angle GBF$ are complementary angles
- e) $\angle GBA$, $\angle FBC$ and $\angle DBE$ are supplementary angles
- f) $\angle GBD - \angle FBA = 10^\circ$



5) Read the following description of angles:

$$\angle ABC + \angle CBD + \angle DBE = 180^\circ.$$

$\angle ABC$ is twice the size of $\angle DBE$ and of $\angle CBD$.

- a) Draw a diagram to represent this situation.
- b) Determine the size of each angle, giving reasons for your answers.

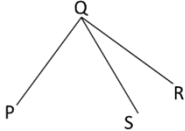
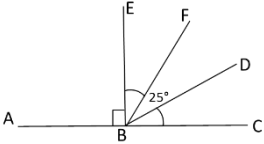
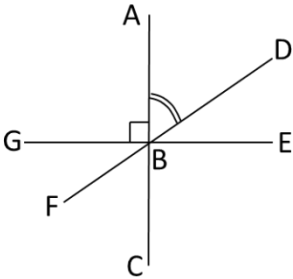
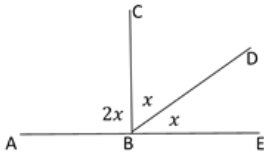
#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 1.8

Answers



| | | | |
|---|--|---|--|
| Questions | <p>1) In each diagram below, we have marked 2 angles with symbols ★ and ⊙. Which diagrams show the angle relationships in i – iii? Write the letter of the diagram/s.</p> <p>i) Adjacent complementary angles ii) Complementary angles iii) Vertically opposite angles</p> | <p>2) $P\hat{Q}S$ and $S\hat{Q}R$ are complementary angles. If $P\hat{Q}S$ is three times the size of $S\hat{Q}R$ what is the size of each angle?</p>  | <p>3) What is the size of $A\hat{B}D$? Give reasons for your answer.</p>  |
| Answers | <p>1) i) B;C ii) B;C;D;E iii) F</p> | <p>2) $P\hat{Q}S + S\hat{Q}R = 90^\circ$ complementary $\angle s$ OR given $P\hat{Q}S = 3 S\hat{Q}R$ given $\therefore 4 S\hat{Q}R = 90^\circ$ $S\hat{Q}R = 22,5^\circ$ $\therefore P\hat{Q}S = 3(22,5^\circ) = 67,5^\circ$</p> | <p>3) $A\hat{B}E + E\hat{B}C = 180^\circ$ $\angle s$ on a str line $A\hat{B}E = 90^\circ$ given So, $2(E\hat{B}F) + 25^\circ = 90^\circ$ $E\hat{B}F = 65^\circ \div 2 = 32,5^\circ$ $A\hat{B}D = 90^\circ + 32,5^\circ + 25^\circ = 147,5^\circ$</p> |
| Questions | | Answers | |
| <p>4) $A\hat{B}D = 50^\circ$. State whether the following statements are TRUE or FALSE. Support your answers with reasons (and calculations if necessary).</p> <p>a) $F\hat{B}C = 50^\circ$ b) $G\hat{B}D = F\hat{B}E$ c) $G\hat{B}E$ is a right angle d) $A\hat{B}D$ and $G\hat{B}F$ are complementary angles e) $G\hat{B}A$, $F\hat{B}C$ and $D\hat{B}E$ are supplementary angles f) $G\hat{B}D - F\hat{B}A = 10^\circ$</p>  | | <p>4)</p> <p>a) True: vert opp $\angle s$ b) True: vert opp $\angle s$ c) False: right \angle d) True: $\angle s$ on a str line e) False: Supplementary angles are TWO angles that add to 180° f) True: $90^\circ + 50^\circ - (90^\circ + 40^\circ) = 10^\circ$</p> | |
| <p>5) Read the following description of angles: $A\hat{B}C + C\hat{B}D + D\hat{B}E = 180^\circ$. $A\hat{B}C$ is twice the size of $D\hat{B}E$ and of $C\hat{B}D$.</p> <p>a) Draw a diagram to represent this situation. b) Determine the size of $A\hat{B}C$, giving reasons for your answer.</p> | | <p>5 a)</p>  <p>b) $4x = 180^\circ$ given $2x = 90^\circ$ $\therefore A\hat{B}C = 90^\circ$</p> | |

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

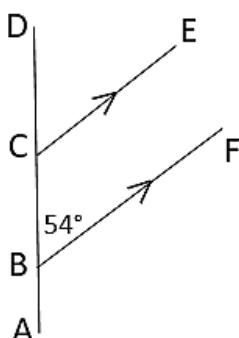
Worksheet 2.1

This worksheet deals mainly with relationships between alternate, corresponding and co-interior angles when parallel lines are cut by a transversal. It draws on earlier work involving angles around a point, and angles on a straight line.

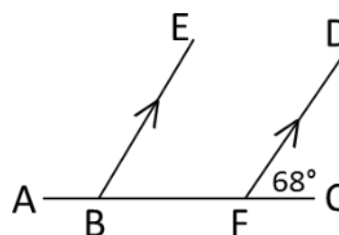
1) Complete the statements:

- The sum of angles around a point is _____
- If two lines are parallel, then their co-interior angles _____

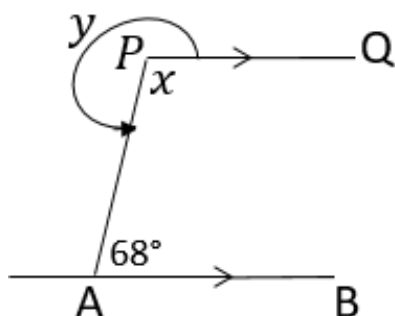
2) Determine the size of $\angle DCE$ and $\angle ECB$.
Give a reason for each statement.



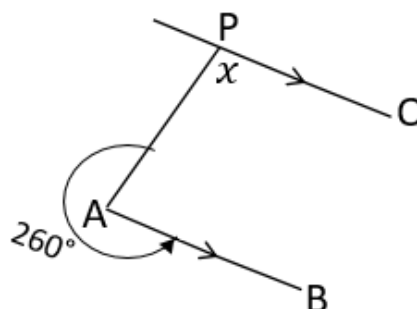
3) Determine the size of $\angle EBA$.
Give reasons.



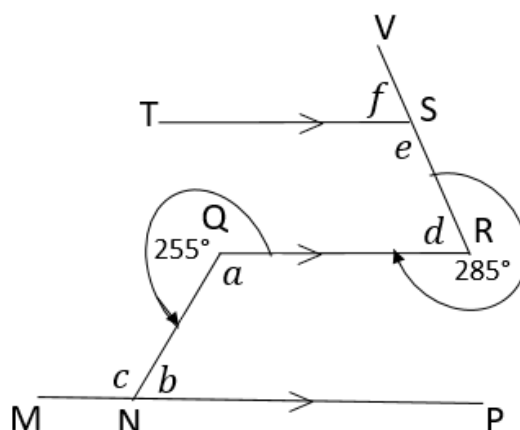
4) Determine the sizes of x and y .
Give reasons.



5) Determine the size of x .
Give reasons.



6) Determine a, b, c, d, e and f (preferably) in this order. Give reasons.

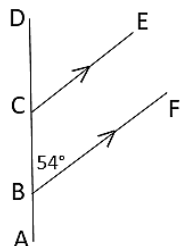
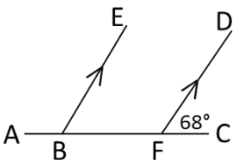
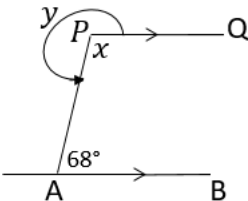
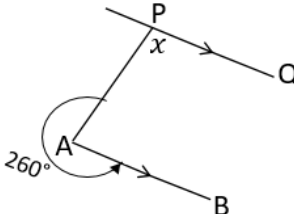
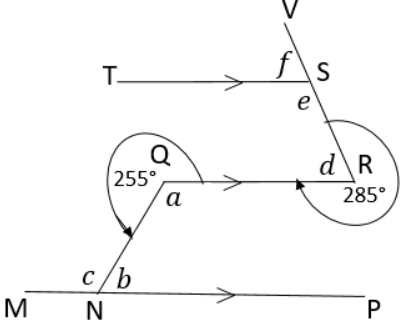


#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 2.1

Answers

| | | | |
|-----------|---|--|---|
| Questions | <p>1) Complete the statements:</p> <p>a) The sum of angles around a point is ____</p> <p>b) If two lines are parallel, then their co-interior angles _____</p> | <p>2) Determine the size of $D\hat{C}E$ and $E\hat{C}B$. Give a reason for each statement.</p>  | <p>3) Determine the size of $E\hat{B}A$. Give reasons.</p>  |
| Answers | <p>1) a) 360° b) Are supplementary OR add up to 180°</p> | <p>2) $D\hat{C}E = 54^\circ$ corresp \angles, $CE \parallel BF$ $E\hat{C}B = 126^\circ$ co-int \angles, $CE \parallel BF$ OR \angles on a str line</p> | <p>3) $E\hat{B}F = 68^\circ$ corresp \angles, $BE \parallel DF$ $E\hat{B}A = 112^\circ$ \angles on a str line</p> |
| Questions | <p>4) Determine the sizes of x and y. Give reasons.</p>  | <p>5) Determine the size of x. Give reasons.</p>  | <p>6) Determine a, b, c, d, e and f (preferably) in this order. Give reasons.</p>  |
| Answers | <p>4) $x = 112^\circ$ co-int \angles, $PQ \parallel AB$ $y = 248^\circ$ \angles around a pt.</p> | <p>5) $P\hat{A}B = 100^\circ$ \angles around a pt $x = 80^\circ$ co-int \angles, $AB \parallel PQ$</p> | <p>6) $a = 105^\circ$ \angles around a pt $b = 75^\circ$ co-int \angles, $MP \parallel QR$ $c = 105^\circ$ alt \angles, $MP \parallel QR$ OR \angles on a str line $d = 75^\circ$ \angles around a pt $e = 105^\circ$ co-int \angles, $TS \parallel QR$ $f = 75^\circ$ corres \angles, $TS \parallel QR$ OR \angles on a str line</p> |

Worksheet 2.2

In this worksheet you will

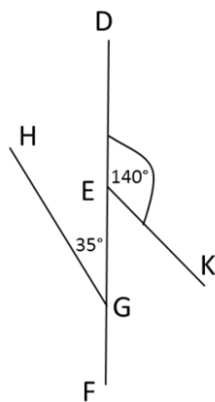
- Use your knowledge about alternate, corresponding and co-interior angles to state whether lines cut by a transversal are parallel or not
- Work with angles on a straight line, vertically opposite angles and angle relationships when parallel lines are cut by a transversal.

1) Is this statement TRUE or FALSE: *Alternate angles are always equal.*

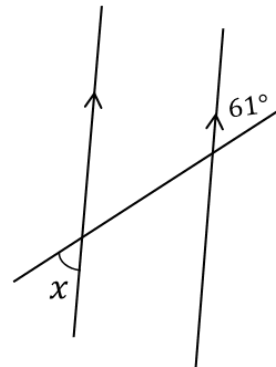
2) If a transversal intersects 5 parallel lines,

- How many angles will be formed?
- How many pairs of co-interior angles will be supplementary?

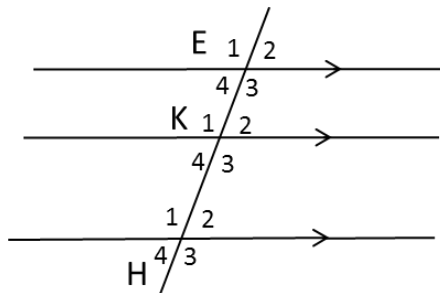
3) DEGF is a straight line. Is $GH \parallel EK$?
Justify your answer.



4) Is $x = 61^\circ$? Justify your answer.

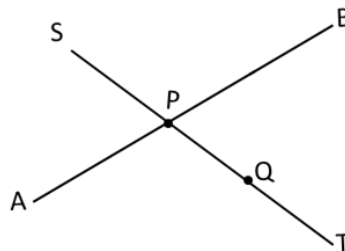


5) If $\hat{K}_2 = 78^\circ$, determine the size of all the other angles in the diagram.
Copy the diagram and write in the angle sizes.



6) AB intersects SPQT at P.

- If $\hat{SPB} = 134^\circ$, determine the sizes of the other 3 angles.
- Draw line CD so that it intersects ST at Q and is parallel to AB. Determine the size of \hat{PQC} .

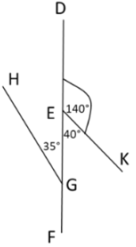
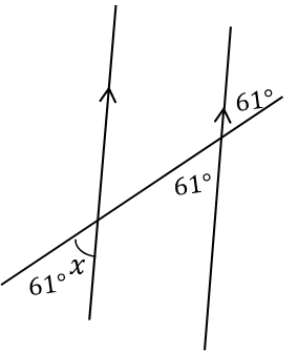
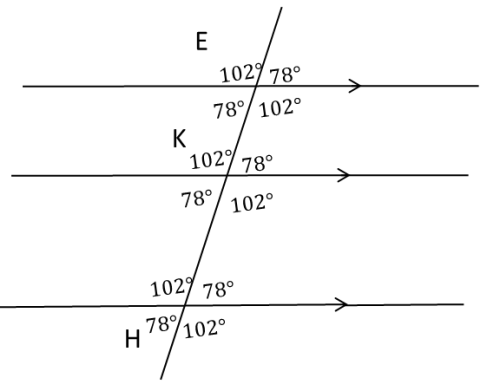
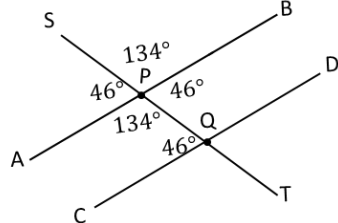


#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 2.2

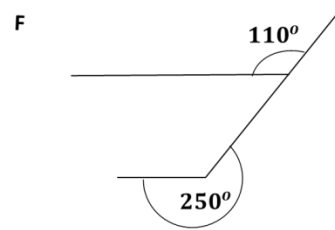
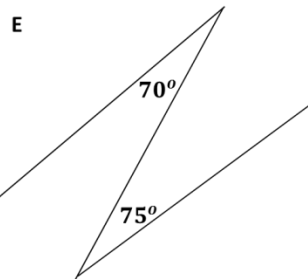
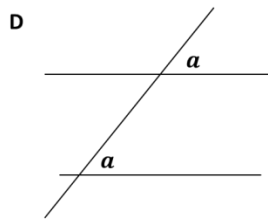
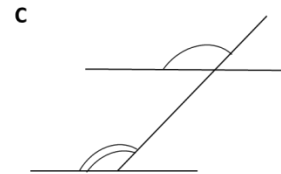
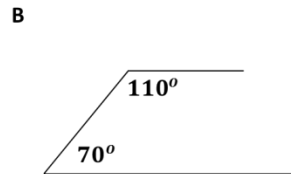
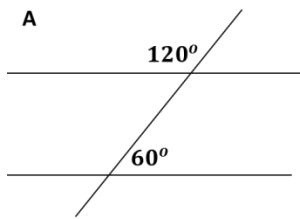
Answers

| Questions | Answers |
|---|---|
| 1) Is this statement TRUE or FALSE: <i>Alternate angles are always equal.</i> | 1) False. They will only be equal if the lines are parallel. |
| 2) If a transversal intersects 5 parallel lines, a) How many angles will be formed? b) How many pairs of co-interior angles will be supplementary? | 2) a) 20 angles. At each intersection 4 angles are formed. Imagine the diagram for Q5 with 2 more parallel lines. b) 8 pairs, lying on both sides of the transversal. See the 4 pairs in the diagram for Q5 and imagine the diagram with 5 parallel lines. |
| 3) DEGF is a straight line. Is $GH \parallel EK$? Justify your answer. | 3) NO, because the alternate angles are not equal, and so the lines will not be parallel  |
| 4) Is $x = 61^\circ$? Justify your answer. | 4) Yes, because it is vertically opposite to the corresponding angle to 61° and the lines are parallel.  |
| 5) If $\hat{K}_2 = 78^\circ$, determine the size of all the other angles in the diagram. Copy the diagram and write in the angle sizes. | 5)  |
| 6) AB intersects SPQT at P. a) If $\hat{S}PB = 134^\circ$, determine the sizes of the other 3 angles. b) Draw line CD so that it intersects ST at Q and is parallel to AB. Determine the size of $\hat{P}QC$. | 6) a) $\hat{A}PQ = 134^\circ$ vert opp \angle s $\hat{S}PA = 46^\circ$ \angle s on a str line $\hat{STB} = 46^\circ$ vert opp \angle s b) $\hat{A}PQ = \hat{S}PB = 134^\circ$ vert opp \angle s $\hat{P}QC = 46^\circ$ co-int \angle s, $AB \parallel CD$  OR swop C and D: $\hat{S}PB = \hat{P}QC = 134^\circ$ corresp \angle s, $AB \parallel CD$ |

Worksheet 2.3

This worksheet focuses on corresponding, alternate and co-interior angles when pairs of lines are cut by a transversal.

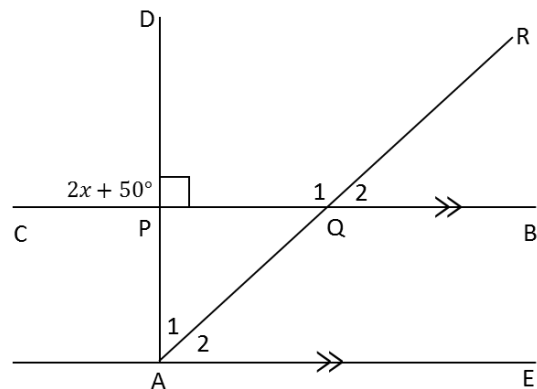
1) Which of the following diagrams do not represent parallel lines?



2) Use the diagram to answer the following questions.

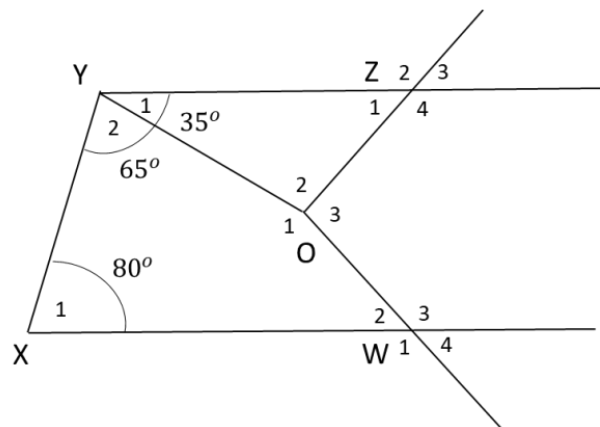
Give reasons for your answers.

- Calculate the value of x .
- If $\hat{A}_2 = 3x$, what is the size of \hat{Q}_2 ?
- Calculate the size of \hat{Q}_1 .



3) Use the diagram below to answer the following:

- Is YZ parallel to XW ? Give a reason for your answer.
- State whether the following are TRUE or FALSE:
 - $\hat{O}_1 + \hat{O}_2 + \hat{O}_3 = 360^\circ$
 - $\hat{W}_1 = \hat{W}_3$
 - $\hat{Z}_4 + \hat{W}_3 = 180^\circ$
 - $\hat{O}_1 = \hat{O}_3$
- If $\hat{W}_4 = \hat{Z}_3 = 35^\circ$, determine the size of all the angles around W and Z . Give reasons.

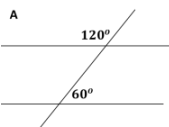
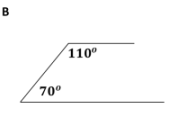
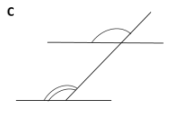
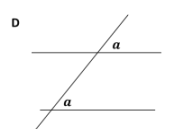
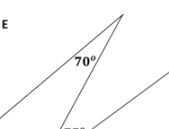
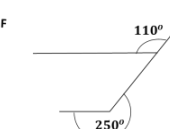
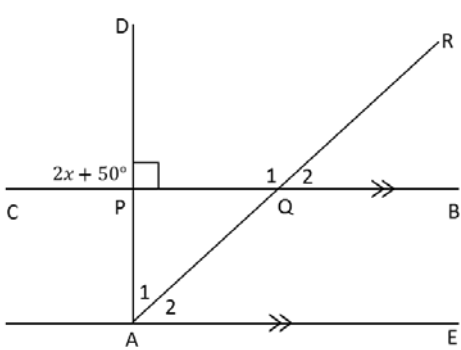
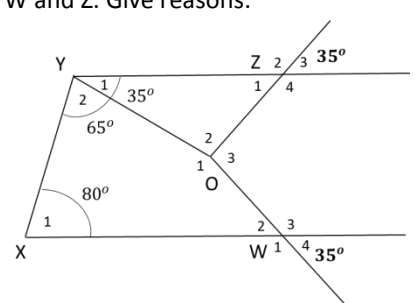


#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 2.3

Answers


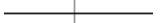
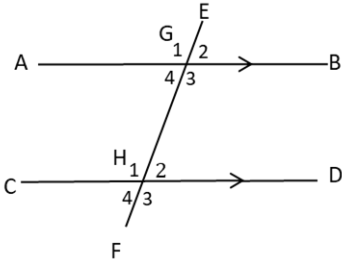
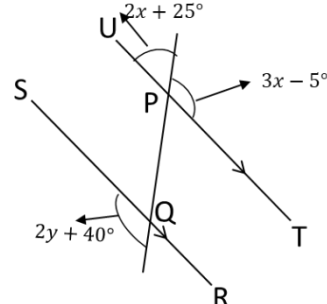
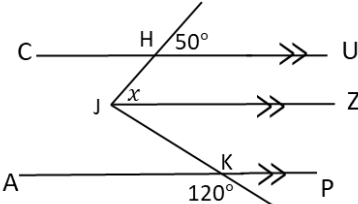
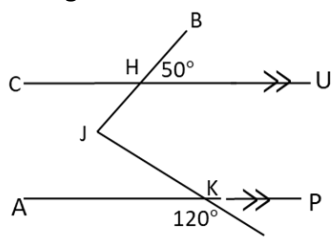
| Questions | Answers |
|--|---|
| <p>1) Which of the following diagrams do <u>not</u> represent parallel lines?</p> <p>A  B  C </p> <p>D  E  F </p> | <p>1)</p> <p>C : The marked angles are in corresponding positions but the markings are different which means the angles are not equal</p> <p>E : Angles in alternate positions are not equal</p> |
| <p>2) Use the diagram to answer the following questions. Give reasons for your answers.</p> <p>a) The value of x.</p> <p>b) If $\hat{A}_2 = 3x$, what is the size of \hat{Q}_2?</p> <p>c) Determine the size of \hat{Q}_1.</p>  | <p>2)</p> <p>a) $2x + 50^\circ + 90^\circ = 180^\circ$ $\angle s$ on a str line $x = 20^\circ$</p> <p>b) $\hat{A}_2 = 3(20^\circ) = 60^\circ$ $\hat{Q}_2 = 60^\circ$ corresp $\angle s$ AE//CB</p> <p>c) $\hat{Q}_1 = 120^\circ$ $\angle s$ on a str line</p> |
| <p>3) Use the diagram below to answer the following.</p> <p>a) Is YZ parallel to XW? Give a reason for your answer.</p> <p>b) State whether the following is TRUE or FALSE:</p> <p>i) $\hat{O}_1 + \hat{O}_2 + \hat{O}_3 = 360^\circ$</p> <p>ii) $\hat{W}_1 = \hat{W}_3$</p> <p>iii) $\hat{Z}_4 + \hat{W}_3 = 180^\circ$</p> <p>iv) $\hat{O}_1 = \hat{O}_3$</p> <p>c) If $\hat{W}_4 = \hat{Z}_3 = 35^\circ$, determine the size of all the angles around W and Z. Give reasons.</p>  | <p>3)</p> <p>a) Yes, co-int $\angle s$ sup</p> <p>b)</p> <p>i) True angles around a point</p> <p>ii) True vert opp $\angle s$</p> <p>iii) False ZOW is not a transversal</p> <p>iv) False $\hat{O}_1 > \hat{O}_3$</p> <p>c)</p> <p>$\hat{W}_2 = 35^\circ$ vert opp $\angle s$</p> <p>$\hat{W}_1 = 145^\circ$ $\angle s$ on a str line</p> <p>$\hat{W}_3 = 145^\circ$ vert opp $\angle s$</p> <p>$\hat{Z}_1 = 35^\circ$ vert opp $\angle s$</p> <p>$\hat{Z}_4 = 145^\circ$ $\angle s$ on a str line</p> <p>$\hat{Z}_2 = 145^\circ$ vert opp $\angle s$</p> |

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 2.4

This worksheet focuses on determining angle sizes or values of variables given parallel lines and includes proving that lines are parallel.



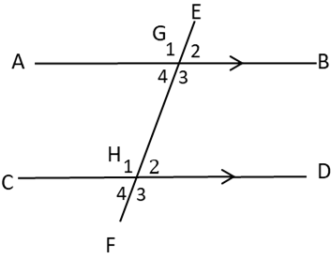
| | |
|---|--|
| <p>1) Which of the following symbols represent parallel lines?</p> <p>A. \equiv B. $=$ C. \parallel D. $\parallel\parallel$ E. $//$ F. \perp</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>There may be more than 1 correct answer in Q1 and Q2.</p> </div> | <p>2) We know that lines in a geometry diagram are parallel when ...</p> <p>A. they are equal in length B. they are the same distance apart C. they don't intersect D. they have arrows like this:  E. they have short lines like this: </p> |
| <p>3) You must use the diagram below three times. Each time the size of the given angle will change.</p>  <p>a) $\hat{H}_2 = 70^\circ$. Write down the sizes of all angles in the diagram. You do not need to give reasons.</p> <p>Now we will focus on writing reasons.</p> <p>b) If $\hat{H}_2 = 75^\circ$, determine the size of \hat{G}_3, \hat{G}_2, \hat{G}_1 and \hat{G}_4 in the order they are listed here. Give reasons for each statement.</p> <p>c) If $\hat{G}_1 = 115^\circ$, determine the size of \hat{G}_3, \hat{H}_1, and \hat{H}_2 in the order they are listed here. Give reasons for each statement.</p> | <p>4) You will use algebra to answer this question</p>  <p>a) Determine the value of x. Give reasons. b) Determine the value of y. Give reasons. c) Copy the diagram and fill in the sizes of all 8 angles on the diagram.</p> |
| <p>5) Three parallel lines are indicated on the diagram.</p>  <p>a) Determine x, giving reasons. b) Is $\hat{H}\hat{J}\hat{K}$ a right angle? Explain.</p> | <p>6)</p> <p>a) Fill in the sizes of as many angles as possible on the diagram.</p>  <p>b) Join HP. When you do this $\hat{H}\hat{P} = 85^\circ$. Is $HP \parallel JK$? Explain.</p> |

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 2.4

Answers

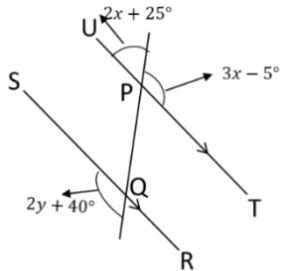
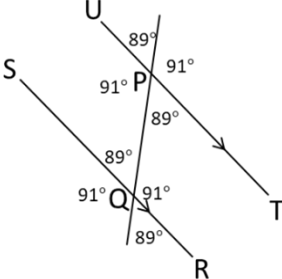
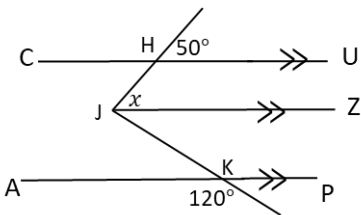
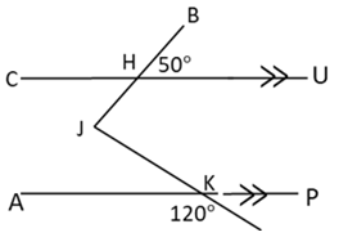
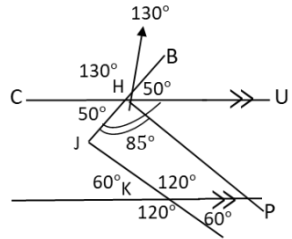
| Question | Answer | Question | Answer |
|--|---------------|---|------------------|
| 1) Which of the following symbols represent parallel lines? A. \equiv B. $=$ C. \parallel D. $ $ E. $//$ F. \perp | 1) C and E | 2) We know that lines in a geometry diagram are parallel when ... A. they are equal in length B. they are the same distance apart C. they don't intersect D. they have arrows like this:  E. they have short lines like this:  | 2) B, C and D |
| Question | | Answer | |
| 3) You must use the diagram below three times. Each time the size of the given angle will change. | | 3) | |
|  | | <p>a) $\hat{H}_2 = \hat{H}_4 = \hat{G}_4 = \hat{G}_2 = 70^\circ$ and $\hat{H}_1 = \hat{H}_3 = \hat{G}_3 = \hat{G}_1 = 110^\circ$</p> <p>b) $\hat{G}_3 = 105^\circ$ co-int \angles, $AB \parallel CD$ $\hat{G}_2 = 75^\circ$ \angles on a str line OR corresp \angles, $AB \parallel CD$ $\hat{G}_1 = 105^\circ$ vert opp \angles $\hat{G}_4 = 75^\circ$ alt \angles, $AB \parallel CD$</p> <p>c) $\hat{G}_3 = 115^\circ$ vert opp \angles $\hat{H}_1 = 115^\circ$ alt \angles, $AB \parallel CD$ $\hat{H}_2 = 65^\circ$ \angles on a str line OR co-int \angles, $AB \parallel CD$</p> | |
| <p>1) $\hat{H}_2 = 70^\circ$. Write down the sizes of all angles in the diagram. You do not need to give reasons. Now we will focus on writing reasons.</p> <p>2) If $\hat{H}_2 = 75^\circ$, determine the size of \hat{G}_3, \hat{G}_2, \hat{G}_1 and \hat{G}_4 in the order they are listed here. Give reasons for each statement.</p> <p>3) If $\hat{G}_1 = 115^\circ$, determine the size of \hat{G}_3, \hat{H}_1, and \hat{H}_2 in the order they are listed here. Give reasons for each statement.</p> | | | |

#TRY-angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 2.4

Answers continued

| Questions | Answers |
|--|--|
| <p>4) You will use algebra to answer this question.</p>  <p>a) Determine the value of x. Give reasons. b) Determine the value of y. Give reasons. c) Copy the diagram and fill in the sizes of all 8 angles on the diagram.</p> | <p>4)</p> <p>a) $3x - 5^\circ + 2x + 25^\circ = 180^\circ$ \angles on a str line $x = 32^\circ$</p> <p>b) $U\hat{P}Q = 3x - 5^\circ$ vert opp \angles $= 3(32^\circ) - 5^\circ$ $= 91^\circ$ $U\hat{P}Q = 2y + 40^\circ$ corresp \angles, $UT//RS$ $2y + 40^\circ = 91^\circ$ $2y = 51^\circ$ $y = 25,5^\circ$</p> <p>c)</p>  |
| <p>5) Three parallel lines are indicated on the diagram.</p>  <p>a) Determine x, giving reasons. b) Is $H\hat{J}K$ a right angle? Explain.</p> | <p>5)</p> <p>a) $x = 50^\circ$ corresp \angles, $HU//JZ$</p> <p>b) $A\hat{K}J = 180^\circ - 120^\circ$ \angles on a str line $= 60^\circ$ $K\hat{J}Z = 60^\circ$ alt \angles, $AP//JZ$ $H\hat{J}K = x + K\hat{J}Z$ $= 50^\circ + 60^\circ$ $= 110^\circ$ $\therefore H\hat{J}K$ is not a right angle because it is not 90°</p> |
| <p>6)</p> <p>a) Fill in the sizes of as many angles as possible on the diagram.</p>  <p>b) Join HP. When you do this $J\hat{H}P = 85^\circ$. Is $HP//JK$? Explain.</p> | <p>6)</p> <p>a) Diagram for a) should exclude HP and $J\hat{H}P = 85^\circ$.</p>  <p>b) $J\hat{H}P = 85^\circ$ Given But $J\hat{H}U = C\hat{H}B = 130^\circ$ vert opp \angles $\therefore P\hat{H}U = 180^\circ - 50^\circ - 85^\circ = 45^\circ$ \angles on a str line $A\hat{P}H = 45^\circ$ alt \angles, $CU//AP$ $A\hat{P}H + J\hat{K}P = 120^\circ + 45^\circ \neq 180^\circ$ $\therefore HP$ and JK are not parallel because the co-interior angles are not supplementary.</p> |

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 2.5

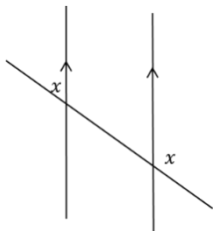
This worksheet focuses on understanding alternate, corresponding and alternate angles when lines are or are not parallel.

1) Say whether these statements are TRUE or FALSE, give reasons for your answers:

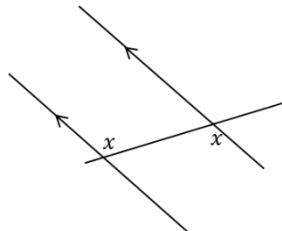
- Corresponding angles are *always* equal
- Co-interior angles are *sometimes* equal

2) In which diagram/s do the angles marked with x represent alternate angles?

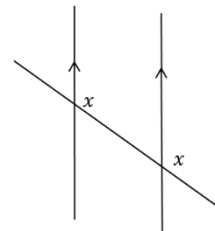
A.



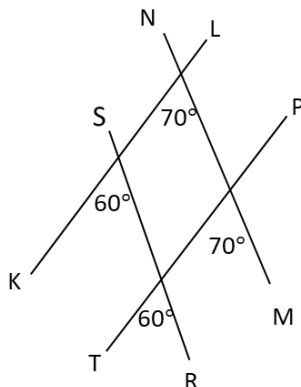
B.



C.

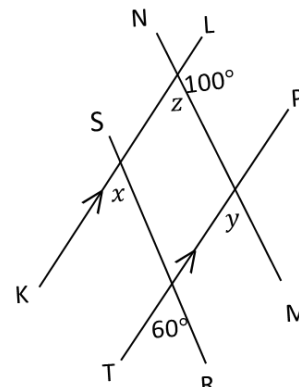


3) The diagram contains 2 pairs of lines. The sizes of 4 angles are given. Use this information to decide which pairs of lines are parallel. Give reasons for your answer.

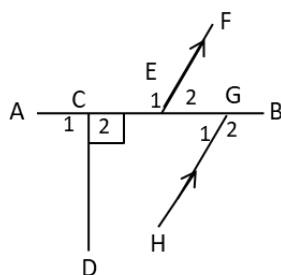


4) The diagram contains 2 pairs of lines.

- Which pair of lines is parallel?
- Determine x , y and z . Give reasons for each statement.

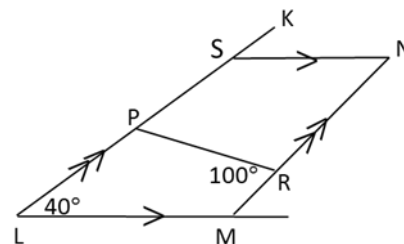


5) Give reasons for all your statements.



- Which angle is corresponding but not equal to \hat{C}_2 ?
- Which angle is alternate and equal to \hat{E}_2 ?
- If you are now told that $\hat{G}_1 = 45^\circ$, determine the sizes of \hat{E}_2 , \hat{G}_2 , \hat{E}_1 and \hat{C}_1 in this order.

6) Give reasons for all your statements.



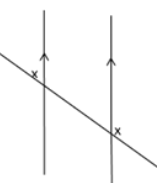
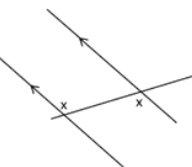
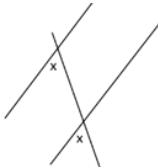
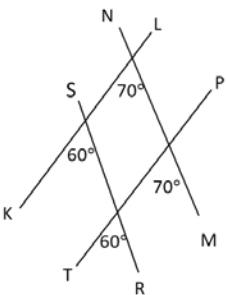
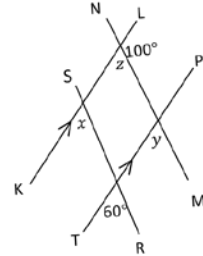
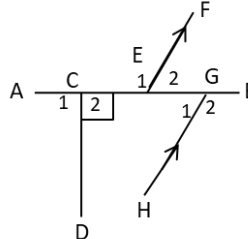
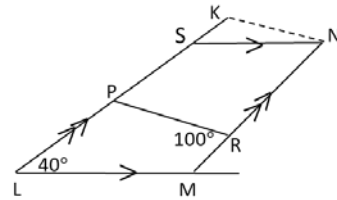
- If $\hat{MRP} = 100^\circ$ and $\hat{MLK} = 40^\circ$, determine the sizes of:
 - \hat{KSN}
 - \hat{SNM}
 - \hat{RPS}
- Join K to N. This will make $\hat{SKN} = 100^\circ$. Is $PR \parallel KN$? Justify your answer.

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 2.5

Answers

| | | | |
|-----------------------------|--|---|---|
| <p>uestions and answers</p> | <p>1) Say whether these statements are TRUE or FALSE, give reasons for your answers:</p> <p>a) Corresponding angles are <i>always</i> equal</p> <p>b) Co-interior angles are <i>sometimes</i> equal</p> <p>Answer</p> <p>1)</p> <p>a) False, only if the lines are parallel</p> <p>b) True, co-interior angles are equal when the lines are parallel and when the two co-interior angles are each 90°</p> | <p>2) In which diagram/s do the angles marked with x represent alternate angles?</p> <p>A. </p> <p>B. </p> <p>C. </p> <p>Answer</p> <p>2) B only</p> | <p>3) The diagram contains 2 pairs of lines. The sizes of 4 angles are given. Use this information to decide which pairs of lines are parallel. Give reasons for your answer.</p>  <p>Answer</p> <p>2) KL//TP because the corresponding angles are equal.</p> |
| <p>Questions</p> | <p>2) The diagram contains 2 pairs of lines.</p> <p>a) Which pair of lines is parallel?</p> <p>b) Determine x, y and z. Give reasons for each statement.</p>  | <p>3) Give reasons for all your statements.</p> <p>a) Which angle is corresponding but not equal to \hat{C}_2?</p> <p>b) Which angle is alternate and equal to \hat{E}_2?</p> <p>c) If you are now told that $\hat{G}_1 = 45^\circ$, determine the sizes of \hat{E}_2, \hat{G}_2, \hat{E}_1 and \hat{C}_1 in this order.</p>  | <p>4) Give reasons for all your statements.</p>  <p>a) If $\hat{MRP} = 100^\circ$ and $\hat{MLK} = 40^\circ$ determine the sizes of:</p> <p>i) \hat{KSN} ii) \hat{SNM} iii) \hat{RPS}</p> <p>b) Join K to N. This will make $\hat{SKN} = 100^\circ$. Is $PR \parallel KN$? Justify your answer.</p> |
| <p>Answers</p> | <p>4)</p> <p>a) KL//TP</p> <p>b) $z = 80^\circ$ \angles on a str line</p> <p>$y = z = 80^\circ$ corresp \angles KL//TP</p> <p>$x = 60^\circ$ corresp \angles KL//TP</p> | <p>5)</p> <p>a) \hat{G}_2 b) \hat{G}_1</p> <p>b) $\hat{G}_1 = 45^\circ$ given</p> <p>$\hat{E}_2 = 45^\circ$ alt \angles, $EF \parallel GH$</p> <p>$\hat{G}_2 = 180^\circ - 45^\circ = 135^\circ$ \angles on a str line</p> <p>$\hat{E}_1 = 135^\circ$ \angles on a str line</p> <p>$\hat{C}_1 = 90^\circ$ \angles on a str line</p> | <p>6)</p> <p>a)</p> <p>i) $\hat{KSN} = 40^\circ$ corresp \angles, $LM \parallel SN$</p> <p>ii) $\hat{SNM} = 40^\circ$ alt \angles, $KL \parallel NM$</p> <p>iii) $\hat{RPS} = 100^\circ$ alt \angles, $KL \parallel MN$</p> <p>b) $\hat{RPS} = 100^\circ$ from iii above and $\hat{SKN} = 100^\circ$ is given. They are co-interior angles which sum to 200° not 180°. So $PR \nparallel KN$.</p> |

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

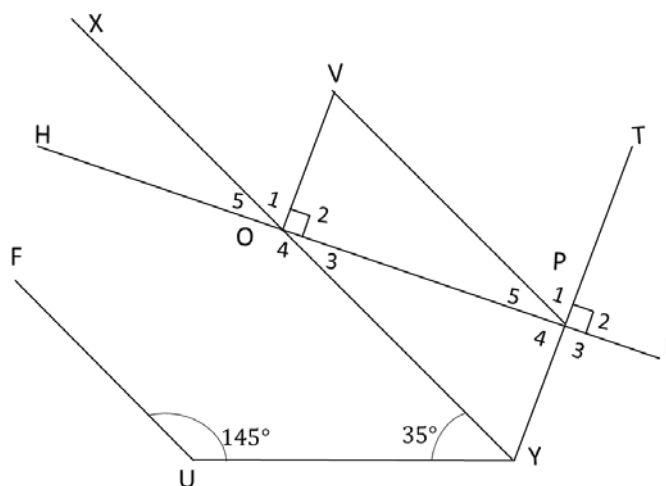
Worksheet 2.6

This worksheet focuses on several properties of lines and angles, including parallel lines.

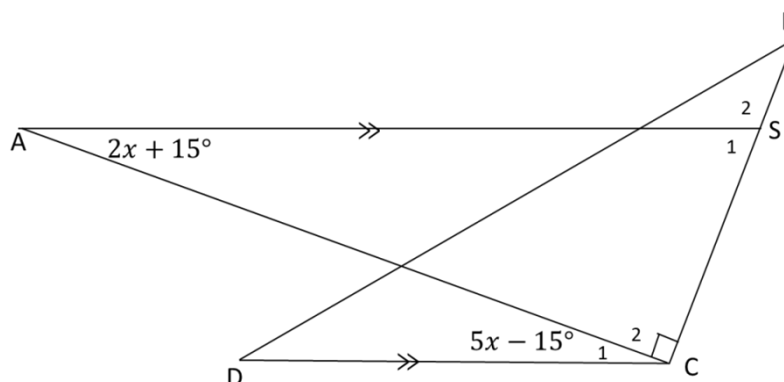
1) Look at the diagram and say whether the following statements are TRUE or FALSE.

If TRUE, provide reasons. If FALSE, correct the statement.

- \hat{O}_1 and \hat{O}_5 are adjacent complementary angles.
- \hat{O}_2 and \hat{P}_4 are corresponding angles.
- VO and TY are parallel to each other.
- UF and OY are parallel to each other.
- \hat{O}_5 and \hat{O}_2 are vertically opposite angles.



2) In the diagram $AS \parallel DC$.



- Determine, with reasons, the value of x .
- Determine, with reasons, the size of \hat{C}_1 .
- Determine, with reasons, the size of \hat{S}_1 in TWO different ways.

#TRY–angles

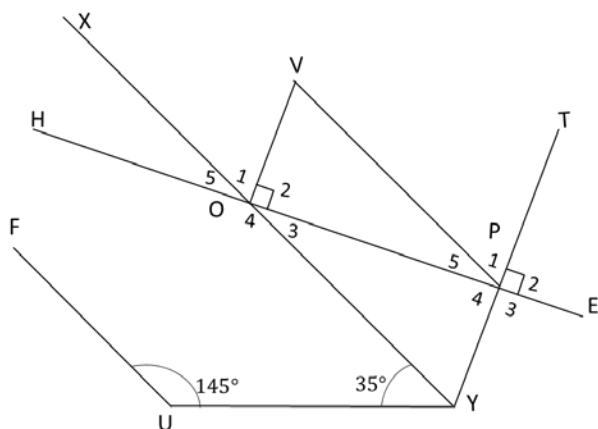
PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 2.6

Answers

Question

- 1) Look at the diagram and say whether the following statements are TRUE or FALSE. If TRUE, provide reasons. If FALSE, correct the statement.
- \hat{O}_1 and \hat{O}_5 are adjacent complementary angles.
 - \hat{O}_2 and \hat{P}_4 are corresponding angles.
 - VO and TY are parallel to each other.
 - UF and OY are parallel to each other.
 - \hat{O}_5 and \hat{O}_2 are vertically opposite angles.

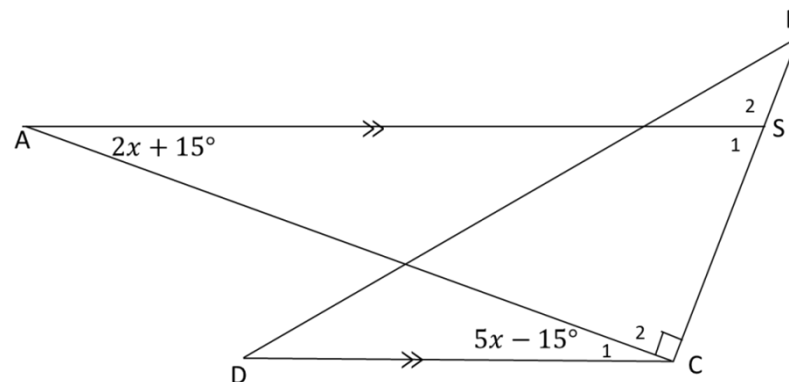


Answer

- 1)
- True $\hat{O}_2 = 90^\circ$ and \hat{O}_2, \hat{O}_1 and \hat{O}_5 are adjacent \angle s on a str line, so \hat{O}_1 and \hat{O}_5 are adjacent complementary \angle s
 - False \hat{O}_2 and \hat{P}_4 are alternate not corresponding angles
 - True corresp \angle s = [corresp \angle s are \hat{O}_4 and \hat{P}_2]
 - True co-int \angle s supp [co-int \angle s are \hat{U} and \hat{XYU}]
 - False because \hat{O}_5 and \hat{O}_3 are vertically opposite angles

Question

- 2) In the diagram AS//DC.



- Determine, with reasons, the value of x .
- Determine, with reasons, the size of \hat{C}_1 .
- Determine, with reasons, the size of \hat{S}_1 in TWO different ways.

Answer

2)

- $2x + 15^\circ = 5x - 15^\circ$ alt \angle s, AS//DC
 $15^\circ + 15^\circ = 5x - 2x$
 $30^\circ = 3x$
 $x = 10^\circ$
- $\hat{C}_1 = 5x - 15^\circ$ given
 $= 5(10^\circ) - 15^\circ$
 $= 35^\circ$
- Method 1:

$$\hat{C}_1 + \hat{C}_2 = 35^\circ + 90^\circ$$

$$= 125^\circ$$

$$\hat{C}_1 + \hat{C}_2 + \hat{S}_1 = 180^\circ \quad \text{co-int } \angle\text{s, AS//DC}$$

$$\hat{S}_1 = 180^\circ - 125^\circ$$

$$= 55^\circ$$

Method 2:

$$\hat{C}_1 + \hat{C}_2 = \hat{S}_2 \quad \text{corresp } \angle\text{s, AS//DC}$$

$$= 55^\circ$$

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 3.1

This worksheet focuses on the sum of the angles of a triangle and types of triangles.

- 1) Do the angles in the table represent the interior angles of a triangle?

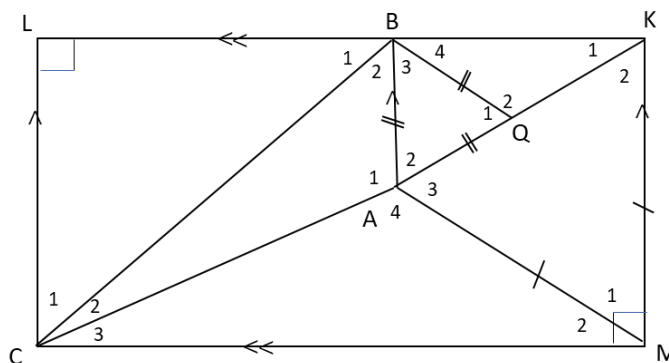
If they do,

- make a tick (✓) in the Δ column
- Name the type of triangle.

| Angles | Δ ? | Name of type of Δ |
|---------------------------------------|------------|--------------------------|
| $30^\circ, 40^\circ$ and 120° | | |
| $30^\circ, 30^\circ$ and 120° | | |
| $70^\circ, 40^\circ$ and 70° | | |
| $30^\circ, 30^\circ$, and 30° | | |
| $175^\circ, 4^\circ$ and 1° | | |
| $75^\circ, 12^\circ$ and 80° | | |
| $89^\circ, 89^\circ$ and 89° | | |
| $60^\circ, 60^\circ$ and 60° | | |

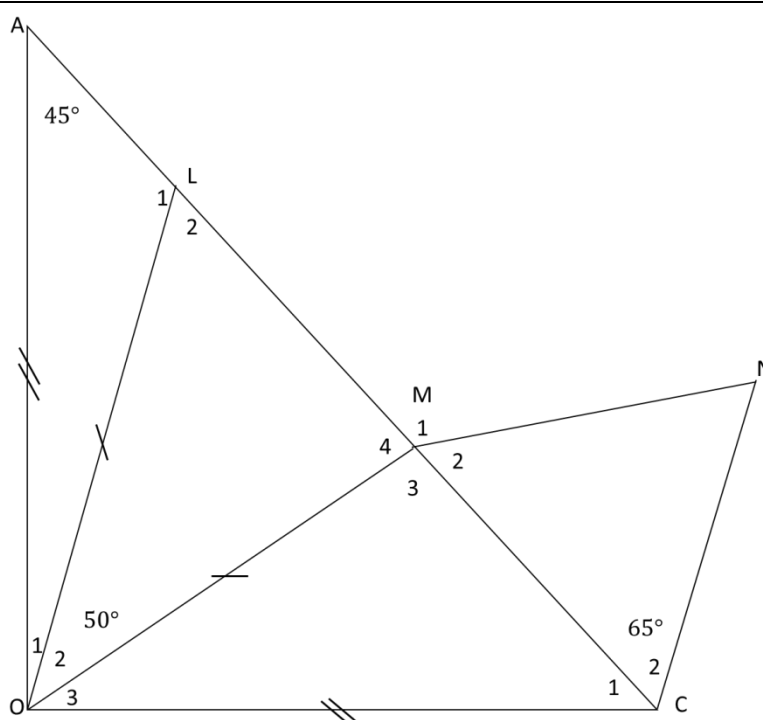
- 2) Name one of each of the following types of triangles in the diagram.

- Acute-angled
- Right-angled
- Obtuse-angled
- Scalene
- Isosceles
- Equilateral



- 3) Look at the diagram.

- $OA = OC$ and $\hat{A} = 45^\circ$.
Fill in the size of \hat{C}_1 and \hat{AOC} on the diagram.
- Given that $OL = OM$ and $\hat{O}_2 = 50^\circ$, fill in the size of the other angles of $\triangle LOM$.
- Fill in the size of the other angles of $\triangle AOL$.
- Fill in the size of \hat{M}_3 and \hat{O}_3 .
- Show that $MC = CN$ then fill in the size of the other angles in $\triangle MCN$ on the diagram.
- True or false? OMN a straight line. Give a calculation to justify your answer.

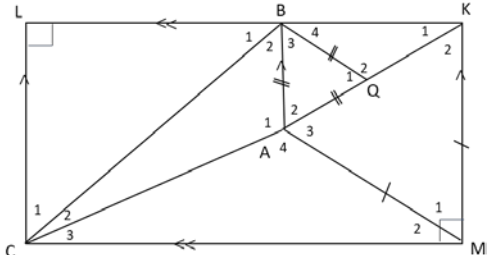
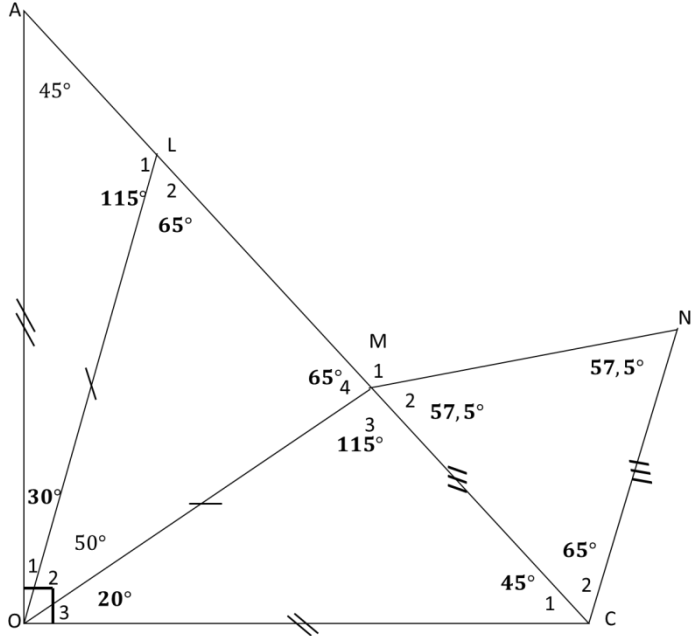


#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 3.1

Answers

| Question | Answer | Question and answer | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--|-----------|--------------------------|--------------------------------------|--|--|--------------------------------------|---|-----------|-------------------------------------|---|-----------|-------------------------------------|--|--|------------------------------------|---|---------------|-------------------------------------|--|--|-------------------------------------|--|--|-------------------------------------|---|-------------|--|
| <p>1) Do the angles in the table represent the interior angles of a triangle? If they do,</p> <ul style="list-style-type: none"> make a tick (✓) in the $\Delta?$ column Name the type of triangle. | <table> <tr> <th>Angles</th><th>$\Delta?$</th><th>Name of type of Δ</th></tr> <tr> <td>$30^\circ, 40^\circ$ and 120°</td><td></td><td></td></tr> <tr> <td>$30^\circ, 30^\circ$ and 120°</td><td>✓</td><td>isosceles</td></tr> <tr> <td>$70^\circ, 40^\circ$ and 70°</td><td>✓</td><td>isosceles</td></tr> <tr> <td>$30^\circ, 30^\circ$ and 30°</td><td></td><td></td></tr> <tr> <td>$175^\circ, 4^\circ$ and 1°</td><td>✓</td><td>Obtuse-angled</td></tr> <tr> <td>$75^\circ, 12^\circ$ and 80°</td><td></td><td></td></tr> <tr> <td>$89^\circ, 89^\circ$ and 89°</td><td></td><td></td></tr> <tr> <td>$60^\circ, 60^\circ$ and 60°</td><td>✓</td><td>equilateral</td></tr> </table> | Angles | $\Delta?$ | Name of type of Δ | $30^\circ, 40^\circ$ and 120° | | | $30^\circ, 30^\circ$ and 120° | ✓ | isosceles | $70^\circ, 40^\circ$ and 70° | ✓ | isosceles | $30^\circ, 30^\circ$ and 30° | | | $175^\circ, 4^\circ$ and 1° | ✓ | Obtuse-angled | $75^\circ, 12^\circ$ and 80° | | | $89^\circ, 89^\circ$ and 89° | | | $60^\circ, 60^\circ$ and 60° | ✓ | equilateral | <p>3) Look at the diagram.</p> <p>a) $OA = OC$ and $\hat{A} = 45^\circ$. Fill in the size of \hat{C}_1 and \hat{AOC} on the diagram.</p> <p>b) Given that $OL = OM$ and $\hat{O}_2 = 50^\circ$, fill in the size of the other angles of $\triangle LOM$.</p> <p>c) Fill in the size of the other angles of $\triangle AOL$.</p> <p>d) Fill in the size of \hat{M}_3 and \hat{O}_3</p> <p>e) Show that $MC = CN$, then fill in the size of the other angles in $\triangle MCN$ on the diagram.</p> <p>f) True or false? OMN a straight line. Give a calculation to justify your answer.</p> |
| Angles | $\Delta?$ | Name of type of Δ | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $30^\circ, 40^\circ$ and 120° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $30^\circ, 30^\circ$ and 120° | ✓ | isosceles | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $70^\circ, 40^\circ$ and 70° | ✓ | isosceles | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $30^\circ, 30^\circ$ and 30° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $175^\circ, 4^\circ$ and 1° | ✓ | Obtuse-angled | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $75^\circ, 12^\circ$ and 80° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $89^\circ, 89^\circ$ and 89° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $60^\circ, 60^\circ$ and 60° | ✓ | equilateral | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>2) Name one of each of the following types of triangles in the diagram.</p>  | <p>Answers</p> <p>a) Acute-angled: $\triangle BAQ$; $\triangle KAM$</p> <p>b) Right-angled: $\triangle CMB$</p> <p>c) Obtuse-angled: $\triangle CAM$; $\triangle BAC$; $\triangle BKQ$</p> <p>d) Scalene: $\triangle BAC$</p> <p>e) Isosceles: $\triangle KAM$</p> <p>f) Equilateral: $\triangle BAQ$</p> | <p>Answers: a) to e)</p>  <p>f) False. $115^\circ + 57,5^\circ \neq 180^\circ$</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Worksheet 3.2

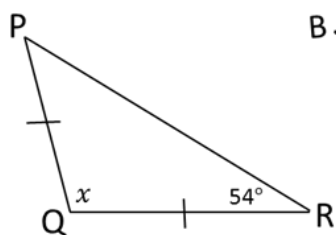
This worksheet focuses on isosceles triangles and includes parallel lines.

- 1) Write down the properties of an isosceles triangle.
Draw a diagram and show the properties on the diagram too.

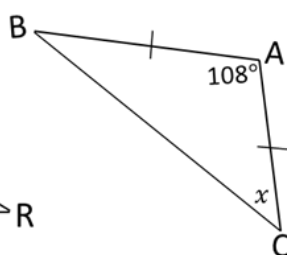
- 2) Is it possible to have an isosceles triangle with an angle of 95° ? Explain.

- 3) Determine the value of x .

a)

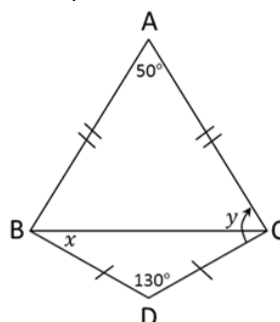


b)

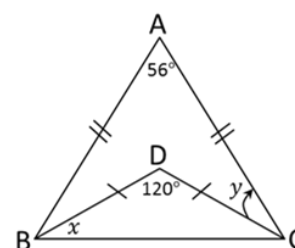


- 4) Determine the value of x and y .

a)

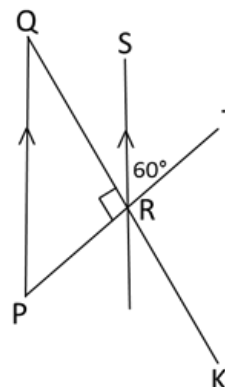


b)



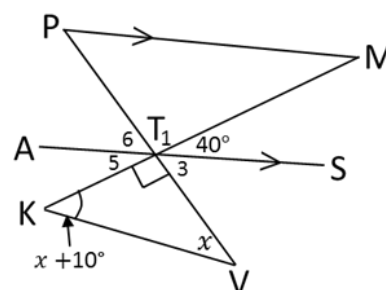
- 5)

- a) Determine the size of $\angle QRS$, \hat{P} and \hat{Q} .
b) When you join KT, it will be parallel to PQ and RS.
Determine size of all the angles in $\triangle RTK$.



- 6) $PM \parallel AS$. PV intersects KM at T.

- a) Determine the sizes of \hat{T}_1 , \hat{T}_3 , \hat{T}_5 , \hat{T}_6 , \hat{M} and \hat{P} .
Give reasons for each statement. You can find the sizes of the 6 angles in any order.
b) Determine the value of x .
Hence determine the size of \hat{K} .

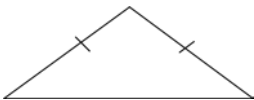
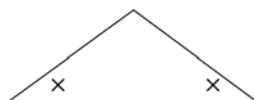
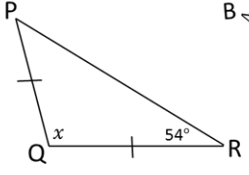
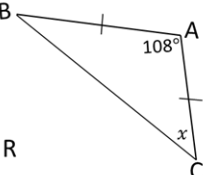
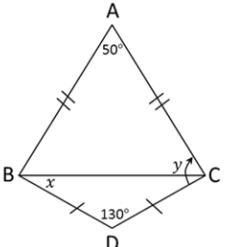
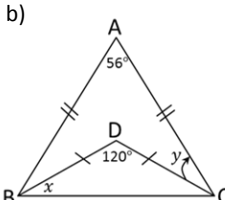


#TRY-angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 3.2

Answers

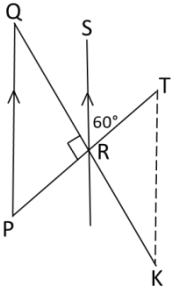
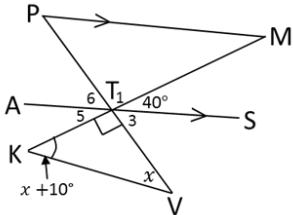
| Question | Answer |
|---|--|
| 1) Write down the properties of an isosceles triangle. Draw a diagram and show the properties on the diagram too. | <p>1)</p> <p>An isosceles triangle has 2 equal <i>sides</i>, the angles opposite the equal sides are equal</p> <p>An isosceles triangle has 2 equal <i>angles</i>, the sides opposite the equal angles are equal</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> |
| 2) Is it possible to have an isosceles triangle with an angle of 95° ? Explain. | <p>2)</p> <p>If one angle is 95°, the two other angles would be $(180^\circ - 95^\circ) \div 2 = 42,5^\circ$. So yes it is possible to have an isosceles triangle with an angle of 95°.</p> |
| 3) Determine the value of x . | <p>3) Reasons are not expected</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>a)</p>  <p>b)</p>  </div> <div style="width: 50%;"> <p>a) $\hat{P} = \hat{R}$ $= 54^\circ$ $\angle s$ opp equal sides $x = 180^\circ - 2(54^\circ)$ int $\angle s \Delta$ $= 72^\circ$</p> <p>b) $\hat{B} = \hat{C} = x$ $\angle s$ opp equal sides $2x = 180^\circ - 108^\circ$ int $\angle s \Delta$ $2x = 62^\circ$ $x = 31^\circ$</p> </div> </div> |
| 4) Determine the value of x and y . | <p>4) Reasons are not expected</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>a)</p>  <p>b)</p>  </div> <div style="width: 50%;"> <p>a) $x = 25^\circ$ $\angle s$ opp equal sides; int $\angle s \Delta$ $\hat{A}\hat{C}\hat{B} = 65^\circ$ $\angle s$ opp equal sides; int $\angle s \Delta$ So, $y = 90^\circ$</p> <p>b) $x = 30^\circ$ $\angle s$ opp equal sides; int $\angle s \Delta$ $\hat{A}\hat{C}\hat{B} = 62^\circ$ $\angle s$ opp equal sides; int $\angle s \Delta$ $y = 32^\circ$</p> </div> </div> |

#TRY-angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 3.2

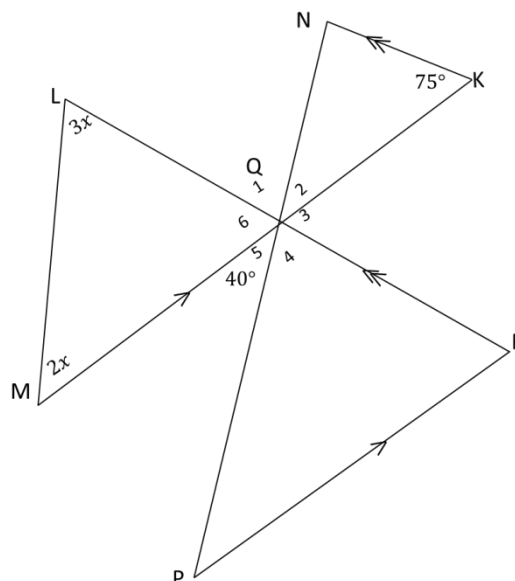
Answers continued

| Question | Answer |
|--|---|
| <p>5)</p> <p>a) Determine the size of $\angle QRS$, \hat{P} and \hat{Q}.</p> <p>b) When you join KT, it will be parallel to PQ and RS. Determine size of all the angles in $\triangle RTK$.</p>  | <p>5) Reasons are not expected</p> <p>a) $\angle QRS = 30^\circ$ \angles on a str line $\hat{P} = 60^\circ$ $\text{corresp } \angle$s, $SR \parallel QP$ $\hat{Q} = 30^\circ$ $\text{alt } \angle$s, $SR \parallel QP$</p> <p>b) $\angle TRK = 90^\circ$ $\text{vert opp } \angle$s $\angle RTK = 60^\circ$ $\text{alt } \angle$s, $SR \parallel TK$ $\angle TRR = 30^\circ$ $\text{alt } \angle$s, $QP \parallel KT$</p> |
| <p>6) $PM \parallel AS$. PV intersects KM at T.</p> <p>a) Determine the sizes of $\hat{T}_1, \hat{T}_3, \hat{T}_5, \hat{T}_6, \hat{M}$ and \hat{P}. Give reasons for each statement. You can find the sizes of the 6 angles in any order.</p> <p>b) Determine the value of x.</p> <p>c) Hence determine the size of \hat{K}.</p>  | <p>6)</p> <p>a) $\hat{T}_1 = 90^\circ$ $\text{vert opp } \angle$s $\hat{T}_3 = 50^\circ$ \angles on a str line $\hat{T}_6 = 50^\circ$ $\text{vert opp } \angle$s $\hat{T}_5 = 40^\circ$ $\text{vert opp } \angle$s $\hat{M} = 40^\circ$ $\text{alt } \angle$s, $PM \parallel AS$ $\hat{P} = 50^\circ$ $\text{alt } \angle$s, $PM \parallel AS$</p> <p>b) $x + 10^\circ + x + 90^\circ = 180^\circ$ \angles on a str line $2x = 80^\circ$ $x = 40^\circ$</p> <p>c) $\hat{K} = x + 10^\circ$ $= 40^\circ + 10^\circ$ $= 50^\circ$ Notice that b and c show that $KV \nparallel PM$.</p> |

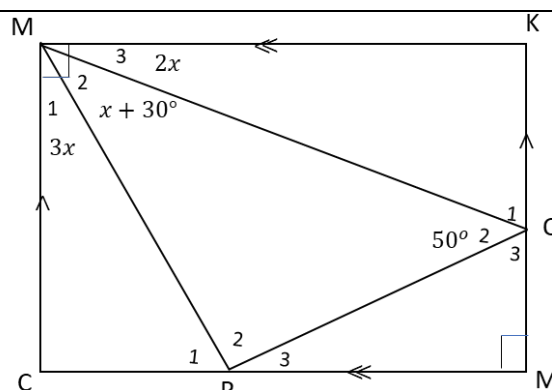
Worksheet 3.3

This worksheet focuses on the sum of the angles of a triangle and includes parallel lines.

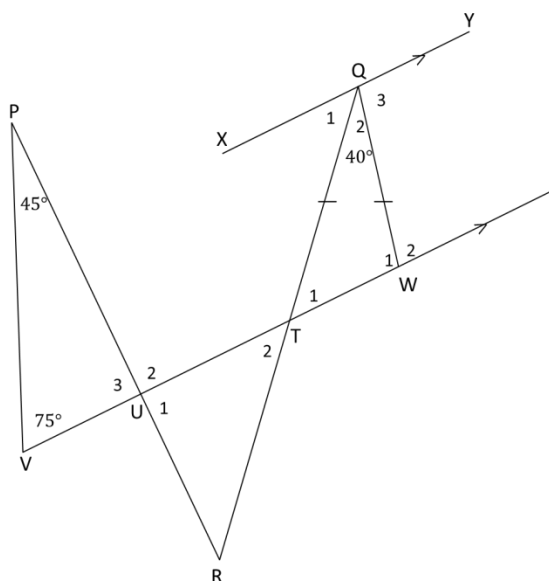
- 1) Refer to the diagram when answering this question
 - a) Write down the pairs of parallel lines shown.
 - b) Fill in the sizes of the unknown angles at Q.
 - c) Determine the value of x with reasons.
 - d) Fill in the size of the unknown angles in $\triangle LMQ$, $\triangle NKQ$ and $\triangle PQR$.



- 2)
- Write down the pairs of parallel lines shown in the diagram.
 - Which angles can be found using the parallel lines?
 - Determine the value of x .
 - Fill in the sizes of the unknown angles.



- 3) In the diagram, $XY \parallel VW$ and $TQ = WQ$. Work out the sizes of the angles in the table, giving reasons.



| Angle | Size | Reasons |
|-------------|------|---------|
| \hat{T}_1 | | |
| \hat{W}_1 | | |
| \hat{Q}_1 | | |
| \hat{Q}_3 | | |
| \hat{T}_2 | | |
| \hat{U}_3 | | |
| \hat{U}_1 | | |
| \hat{R} | | |

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Answers

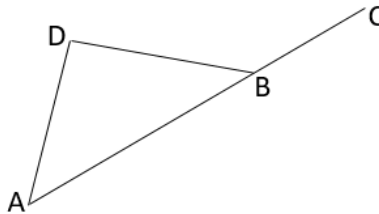
Wits Maths Connect Secondary Project

Worksheet 3.4

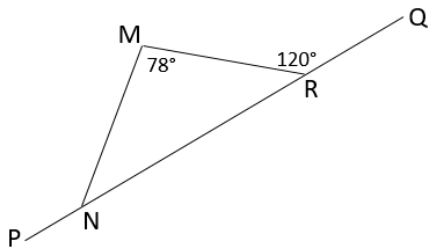
This worksheet focuses on the exterior angle of a triangle and includes isosceles and equilateral triangles and parallel lines.

1) Complete the following:

- The exterior angle formed when you extend a side of a triangle is equal to _____
- $\angle DAB + \angle ADB = \underline{\hspace{2cm}}$

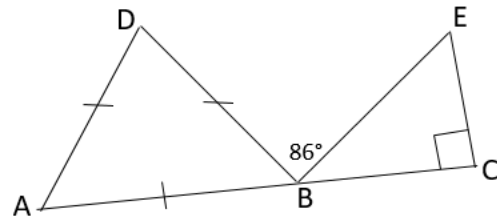


2) Determine the sizes of $\angle MNR$, $\angle NRM$ and $\angle MNP$ in this order.



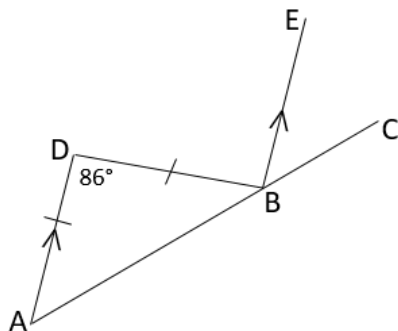
3) ABC is a straight line.

Determine the size of $\angle EBC$ and $\angle BEC$



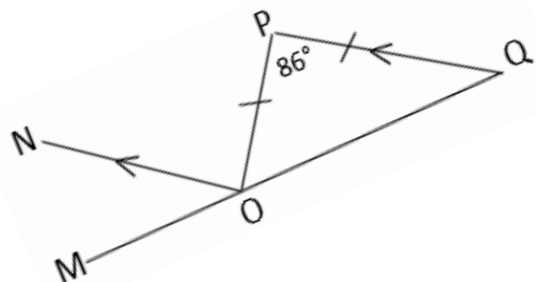
4) ABC is a straight line.

Determine the sizes of $\angle DAB$, $\angle DBE$ and $\angle EBC$



5) MOQ is a straight line.

Determine the size of $\angle MON$

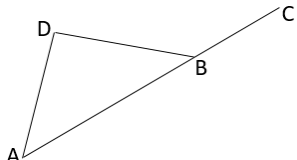
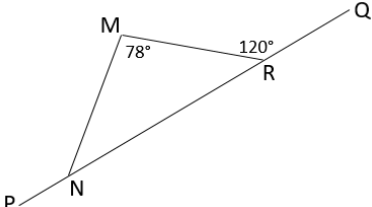
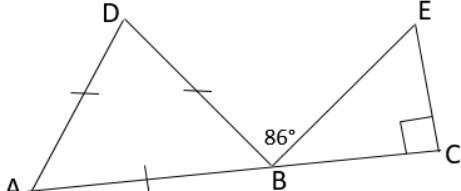
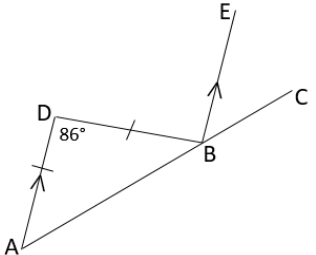
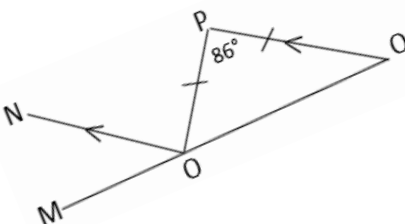


#TRY-angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 3.4

Answers

| | | | |
|------------------|---|--|---|
| Questions | <p>1) Complete the following:</p> <p>a) The exterior angle formed when you extend a side of a triangle is equal to ____</p> <p>b) $\angle DAB + \angle ADB =$ ____</p>  | <p>2) PNRQ is a straight line. Determine the sizes of $\angle MNR$, $\angle NRM$ and $\angle MNP$ in this order.</p>  | <p>3) ABC is a straight line. Determine the size of $\angle EBC$ and $\angle BEC$.</p>  |
| Answers | <p>1)</p> <p>a) the sum of the interior opposite angles</p> <p>b) $\angle DBC$</p> | <p>2) Reasons are not expected</p> <p>$\angle MNR = 42^\circ$ ext \angle of Δ</p> <p>$\angle NRM = 60^\circ$ \angles on a str line</p> <p>$\angle MNP = 138^\circ$ ext \angle of Δ</p> | <p>3) Reasons are not expected</p> <p>$\angle ABD = 60^\circ$ int \angles Δ</p> <p>$\angle EBC = 180^\circ - 60^\circ - 86^\circ = 34^\circ$ \angles on a str line</p> <p>$\angle BEC = 180^\circ - 90^\circ - 34^\circ = 56^\circ$ int \angles Δ</p> |
| Questions | <p>4) ABC is a straight line. Determine the sizes of $\angle DAB$, $\angle DBE$ and $\angle ECB$.</p>  | <p>5) MOQ is a straight line. Determine the size of $\angle MON$</p>  | |
| Answers | <p>4) Reasons are not expected</p> <p>$\angle DAB = (180^\circ - 86^\circ) \div 2 = 47^\circ$ int \angles Δ</p> <p>$\angle DBE = 86^\circ$ alt \angles, AD//BE</p> <p>$\angle ECB = 47^\circ$ corresp \angles, AD//BE</p> | <p>5) Reasons are not expected</p> <p>$\angle PQO = 47^\circ$ int \angles Δ</p> <p>$\angle MON = 47^\circ$ corresp \angles, AD//BE</p> | |

#TRY-angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

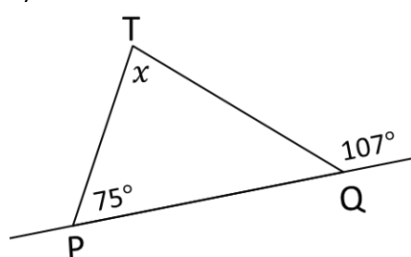
Worksheet 3.5

This worksheet focuses on the exterior angle of a triangle.

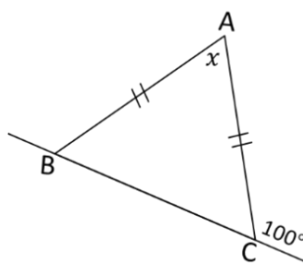
- 1) If 2 lines are perpendicular, the angle between them is ____
- 2) What is wrong with this statement:
"The exterior angle of a triangle is any angle outside the triangle".
 Use a diagram as part of your explanation.
- 3) The exterior angle of an isosceles triangle is 100° . What is the size of the largest angle in the triangle?

- 4) Determine the value of x .

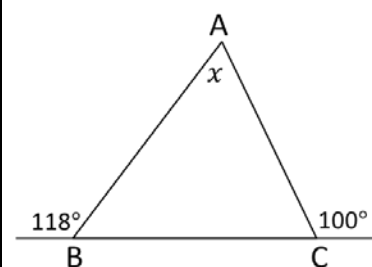
a)



b)

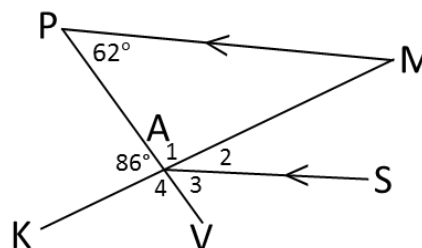


- 5) Determine the value of x .



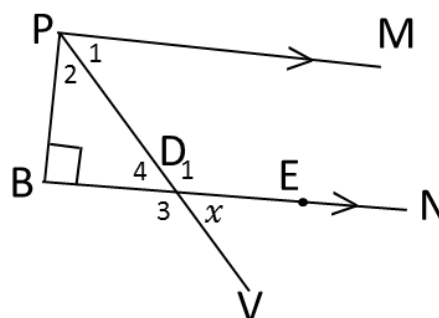
- 6) PV intersects KM at A. PM \parallel AS.

- a) Determine the size of \widehat{M} .
- b) Determine the sizes of $\hat{A}_1, \hat{A}_2, \hat{A}_3$ and \hat{A}_4 .
 Give reasons for each statement. You can find the sizes of the 4 angles in any order.



- 7) PM \parallel BN. PV intersects BN at D. $x = 50^\circ$

- a) Find 2 other angles that have the same value as x .
 Give reasons for your answers.
- b) MV will intersect BN at E. This will create $\widehat{PMB} = 85^\circ$.
 Determine the size of the other angles in $\triangle DEV$, giving reasons for all statements.

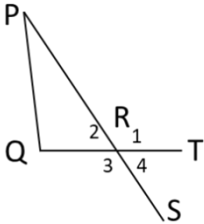
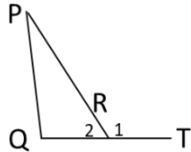


#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 3.5

Answers

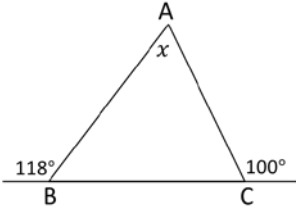
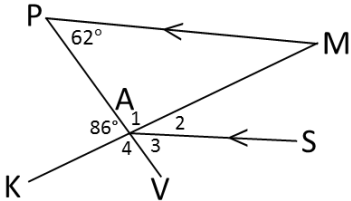
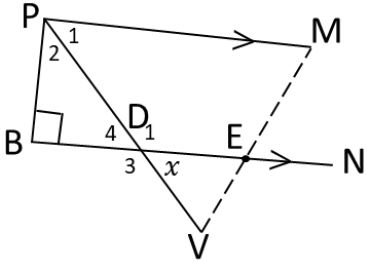
| Question | Answer |
|--|---|
| 1) If 2 lines are perpendicular, the angle between them is ____ | 1) 90° |
| 2) What is wrong with this statement: “The exterior angle of a triangle is any angle outside the triangle”. Use a diagram as part of your explanation. | <p>2) The exterior angle of a triangle is NOT just any angle outside the triangle. This would mean \hat{R}_1; \hat{R}_4 and \hat{R}_3 are all exterior angles of ΔPQR.</p>  <p>Only \hat{R}_1 and \hat{R}_3 are exterior angles of ΔPQR.</p> <p>The exterior angle of a triangle is the angle that lies between the <u>extension</u> of one side of the triangle and a side of the triangle. In the diagram below, QR is extended to T and PR is a side of the triangle next to the extension. \hat{R}_1 is between the extension and the side. $\hat{R}_1 + \hat{R}_2 = 180^\circ$: the interior angle and the exterior angle are adjacent supplementary angles.</p>  |
| 3) The exterior angle of an isosceles angle is 100° . What is the size of the largest angle in the triangle? Diagrams for the answer: | <p>3) There are 2 possibilities for the position of the exterior angle:</p> <ul style="list-style-type: none"> i) The extended side is one of the equal sides (diagram 1) ii) The extended side is the non-equal side (diagram 2) <p>In diagram 1, the angles are $80^\circ, 50^\circ, 50^\circ$. So the largest angle is adjacent to the 100° angle. In diagram 2, the angles are $80^\circ, 80^\circ, 20^\circ$. So the largest angle is also adjacent to the 100° angle but there are 2 angles that are 80°.</p> |
| 4) Determine the size of x . | <p>4) Reasons are not expected</p> <p>a) $x = 107^\circ - 75^\circ$ ext \angle of Δ $= 32^\circ$</p> <p>b) $\hat{ACB} = 70^\circ$ \angles on a str line $\hat{ABC} = 70^\circ$ \angles opp equal sides; $x = 40^\circ$ int \angles Δ</p> |

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 3.5

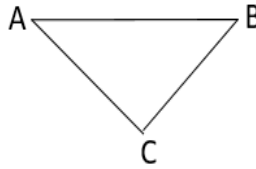
Answers continued

| Question | Answer |
|--|---|
| <p>5) Determine the size of x.</p>  | <p>5) Reasons are not expected</p> <p>$\hat{ACB} = 80^\circ$ $\angle s$ on a str line $x + 80^\circ = 118^\circ$ ext \angle of Δ $x = 38^\circ$</p> <p>OR</p> <p>$\hat{ABC} = 62^\circ$ $\angle s$ on a str line $x + 62^\circ = 100^\circ$ ext \angle of Δ $x = 38^\circ$</p> <p>OR</p> <p>$\hat{ACB} = 80^\circ$ $\angle s$ on a str line $\hat{ABC} = 62^\circ$ $\angle s$ on a str line $x = 180^\circ - 80^\circ - 62^\circ$ int $\angle s$ Δ $= 38^\circ$</p> |
| <p>6) PV intersects KM at A. PM \parallel AS.</p> <p>a) Determine the size of \hat{M}.</p> <p>b) Determine the sizes of $\hat{A}_1, \hat{A}_2, \hat{A}_3$ and \hat{A}_4. Give reasons for each statement. You can find the sizes of the 4 angles in any order.</p>  | <p>6)</p> <p>a) Reasons are not expected $\hat{M} = 24^\circ$ ext \angle of Δ</p> <p>b) Reasons ARE expected</p> <p>$\hat{A}_1 = 94^\circ$ $\angle s$ on a str line or int $\angle s$ Δ or co-int $\angle s$, PM//AS</p> <p>$\hat{A}_2 = 24^\circ$ alt $\angle s$, PM//AS</p> <p>$\hat{A}_3 + \hat{A}_2 = 86^\circ$ vert opp $\angle s$ $\hat{A}_3 = 42^\circ$</p> <p>$\hat{A}_4 = 94^\circ$ vert opp $\angle s$ or $\angle s$ on a str line</p> <p>Reasons depend on the order in which the angle sizes are found</p> |
| <p>7) PM \parallel BN. PV intersects BN at D. $x = 50^\circ$</p> <p>a) Find 2 other angles that have the same value as x. Give reasons for your answers.</p> <p>b) MV will intersect BN at E. This will create $\hat{PMB} = 85^\circ$. Determine the size of the other angles in ΔDEV, giving reasons for all statements.</p>  | <p>7)</p> <p>a) Reasons ARE expected</p> <p>$\hat{D}_4 = 50^\circ$ vert opp $\angle s$ $\hat{P}_1 = 50^\circ$ alt $\angle s$, PM//BN</p> <p>b) Reasons ARE expected</p> <p>$\hat{DEV} = 85^\circ$ corresp $\angle s$, PM//BN $\hat{V} = 45^\circ \dots$ int $\angle s$ Δ</p> <p>OR</p> <p>$\hat{MEB} = 85^\circ$ co-int $\angle s$, PM//BN $\hat{V} = 45^\circ$ ext \angle of Δ</p> |

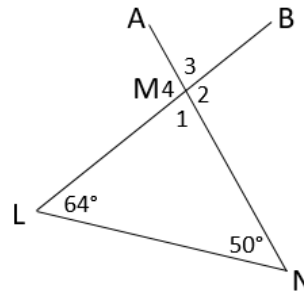
Worksheet 3.6

This worksheet focuses on calculating angle sizes, the effect of different pairs of equal sides and the effect of parallel lines on angle sizes.

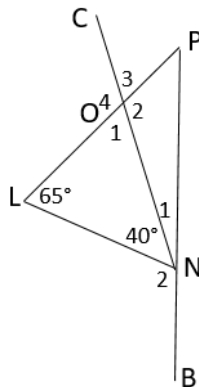
- 1) Complete: $\angle CAB + \angle ACB + \angle CBA = \underline{\hspace{2cm}}$



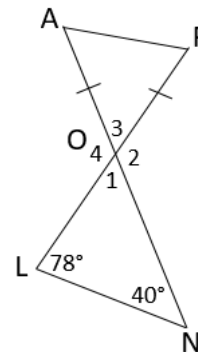
- 2) AN intersects LB at M.
Determine the sizes of \hat{M}_1 , \hat{M}_2 , \hat{M}_3 and \hat{M}_4



- 3) Given: $LOP = PN$.
Determine the sizes of \hat{N}_1 , \hat{N}_2 , \hat{O}_1 , \hat{O}_2 , \hat{O}_3 , \hat{O}_4 and \hat{P}

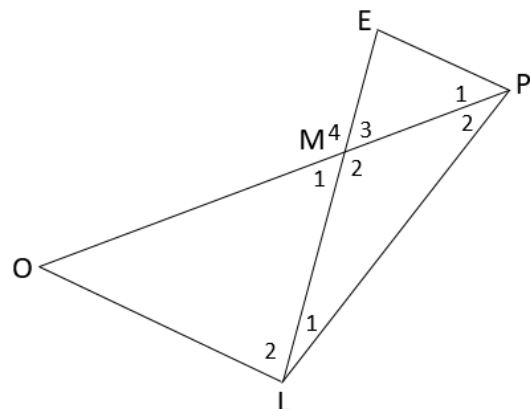


- 4) AN intersects LP at O.
Determine the sizes of \hat{A} , \hat{O}_1 , \hat{O}_2 , \hat{O}_3 , \hat{O}_4 and \hat{P}



- 5) Treat Q5a and Q5b as entirely separate questions.
OP intersects LE at M.

- a) If $EP = EM$, list three angles that are equal.
b) If $EML = PL$, and $EP \parallel OL$ list the angles that are equal.

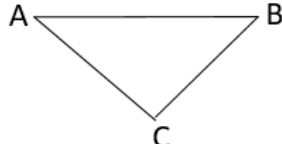
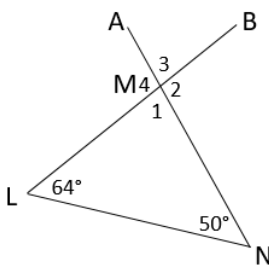
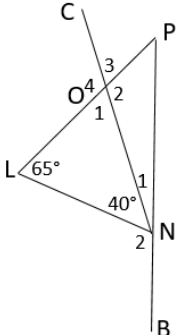
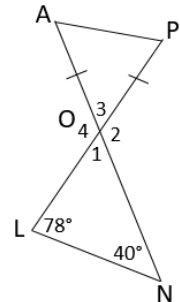
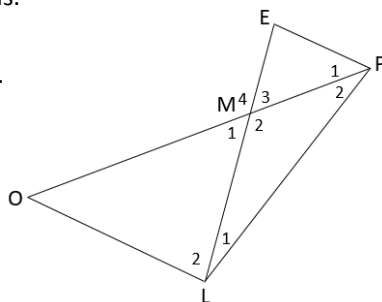


#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 3.6

Answers

| | | | |
|-----------|---|--|---|
| Questions | 1) Complete: $\hat{CAB} + \hat{ACB} + \hat{CBA} = \underline{\hspace{2cm}}$  | 2) AN intersects LB at M. Determine the sizes of $\hat{M}_1, \hat{M}_2, \hat{M}_3$ and \hat{M}_4  | 3) Given: $LOP = PN$. Determine the sizes of $\hat{N}_1, \hat{N}_2, \hat{O}_1, \hat{O}_2, \hat{O}_3, \hat{O}_4$ and \hat{P}  |
| Answers | 1) 180° | 2) Reasons are not expected $\hat{M}_1 = 66^\circ$ int $\angle s \Delta$ or $\angle s$ on a str line $\hat{M}_2 = 114^\circ$ $\angle s$ on a str line or ext \angle of Δ $\hat{M}_3 = 66^\circ$ vert opp $\angle s$ $\hat{M}_4 = 114^\circ$ vert opp $\angle s$ | 3) Reasons are not expected $\hat{N}_1 = 25^\circ$ $\angle s$ opp equal sides $\hat{N}_2 = 112^\circ$ $\angle s$ on a str line $\hat{O}_1 = 75^\circ$ int $\angle s \Delta$ $\hat{O}_2 = 105^\circ$ ext \angle of Δ $\hat{O}_3 = 75^\circ$ vert opp $\angle s$ $\hat{O}_4 = 105^\circ$ vert opp $\angle s$ $\hat{P} = 50^\circ$ int $\angle s \Delta$ |
| Questions | 4) AN intersects LP at O. Determine the sizes of $\hat{A}, \hat{O}_1, \hat{O}_2, \hat{O}_3, \hat{O}_4$ and \hat{P}  | 5) Treat Q5a and Q5b as entirely separate questions. OP intersects LE at M. a) If $EP = EM$, list three angles that are equal. b) If $EML = PL$, and $EP // OL$ list the angles that are equal.  | |
| Answers | 4) Reasons are not expected $\hat{O}_1 = 62^\circ$ int $\angle s \Delta$ $\hat{O}_3 = 62^\circ$ vert opp $\angle s$ $\hat{O}_2 = 118^\circ$ $\angle s$ on a str line $\hat{O}_4 = 118^\circ$ vert opp $\angle s$ $\hat{A} + \hat{P} = 118^\circ$ ext \angle of Δ $\hat{A} = \hat{P} = 56^\circ$ $\angle s$ opp equal sides | 5) Reasons are not expected a) $\hat{M}_3 = \hat{P}_1$ $\angle s$ opp equal sides $\hat{M}_3 = \hat{M}_1$ vert opp $\angle s$ b) $\hat{E} = \hat{EPL}$ $\angle s$ opp equal sides $\hat{E} = \hat{L}_2$ alt $\angle s$, $EP // OL$ $\hat{P}_1 = \hat{O}$ alt $\angle s$, $EP // OL$ | |

#TRY–angles

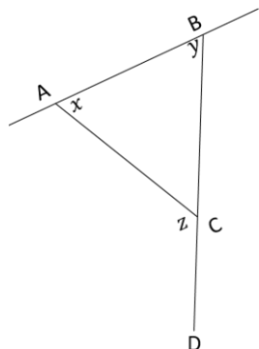
PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 3.7

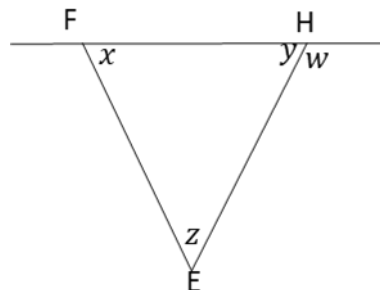
This worksheet focuses on triangles calculations where there are triangles and parallel lines in the diagrams. Reasons are expected.

- 1) BCD is a straight line. Select the true statement and give a reason for your answer:

- A. $x = z$
- B. $y = z$
- C. $x = y$
- D. $z = y - x$
- E. $z = x + y$

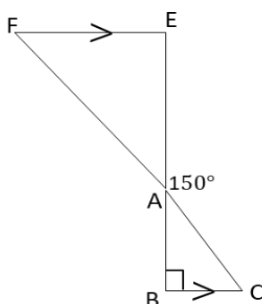


- 2) $\triangle FHE$ is an equilateral triangle, determine the values of w, x, y and z .

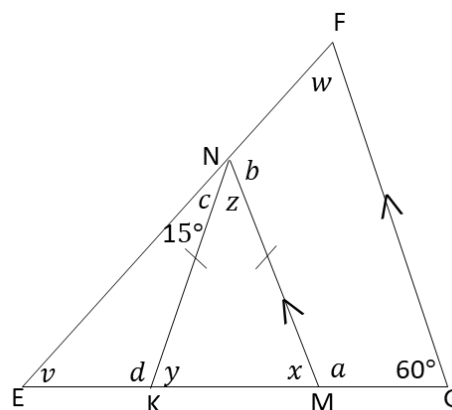


- 3) $FE \parallel BC$ and $\angle EAC = 150^\circ$
Determine with reasons, the sizes of:

- a) \hat{C}
- b) \hat{F}
- c) \hat{E}

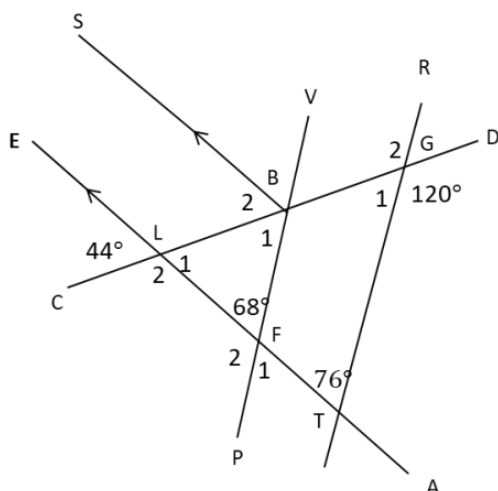


- 4) In the diagram $NK = NM$, $FG \parallel NM$
 $\hat{G} = 60^\circ$ and $c = 15^\circ$. Determine the values of all unknowns, in any order.



- 5) Use the information in the diagram to determine the size of the following angles in TWO DIFFERENT WAYS. Give reasons for all statements.

- a) \hat{B}_1
- b) \hat{B}_2
- c) \hat{G}_1



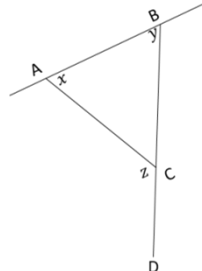
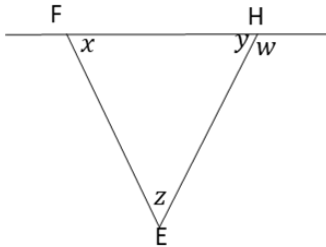
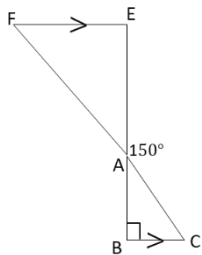
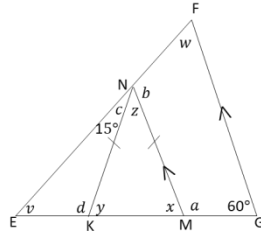
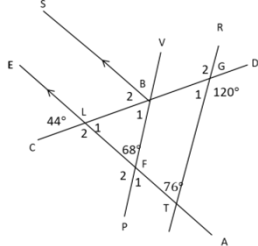
| Angle | Value | Reason |
|-------|-------|--------|
| a | | |
| b | | |
| c | | |
| d | | |
| v | | |
| w | | |
| x | | |
| y | | |
| z | | |

#TRY-angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 3.7

Answers

| Questions | 1) BCD is a straight line. Select the true statement and give a reason for your answer: A. $x = z$ B. $y = z$ C. $x = y$ D. $z = y - x$ E. $z = x + y$  | 2) $\triangle FHE$ is an equilateral triangle, determine the values of w, x, y and z .  | 3) $FE \parallel BC$ and $\angle EAC = 150^\circ$ Determine, with reasons the sizes of: a) \hat{C} b) \hat{F} c) \hat{E}  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------|---|--|---|-------|-------|--------|-----|-------------|--|-----|-------------|--------------------------|-----|------------|-------|-----|-------------|---|-----|------------|---|-----|------------|--------------------------|-----|------------|---|-----|------------|----------------------------|-----|------------|--------------------------------|--|--|
| Answers | 1) E. $z = x + y$ ext \angle of \triangle | 2) Reasons are not expected $x = y = z = 60^\circ$ int \angle s \triangle $w = 120^\circ$ \angle s on a str line | 3) a) $\hat{C} = 60^\circ$ ext \angle of \triangle b) $\hat{F} = 60^\circ$ alt \angle s, $FE \parallel BC$ c) $\hat{E} = 90^\circ$ alt \angle s, $FE \parallel BC$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Questions | 4) In the diagram below, $NK = NM$, $FG \parallel NM$, $\hat{G} = 60^\circ$ and $c = 15^\circ$. Determine the values of all unknowns, in any order.  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Answers | 4) <table><thead><tr><th>Angle</th><th>Value</th><th>Reason</th></tr></thead><tbody><tr><td>a</td><td>120°</td><td>Co-int \angles, $NM \parallel FG$ or \angles on a str line</td></tr><tr><td>b</td><td>105°</td><td>\angles on a str line</td></tr><tr><td>c</td><td>15°</td><td>given</td></tr><tr><td>d</td><td>120°</td><td>\angles on a str line or corresp \angles, or co-int \angles, $NM \parallel FG$</td></tr><tr><td>v</td><td>45°</td><td>ext \angle of \triangle or int \angles \triangle</td></tr><tr><td>w</td><td>75°</td><td>\angles on a str line</td></tr><tr><td>x</td><td>60°</td><td>corresp \angles, $NM \parallel FG$ or \angles on a str line</td></tr><tr><td>y</td><td>60°</td><td>\angles opp equal sides</td></tr><tr><td>z</td><td>60°</td><td>int \angles $\triangle MNK$</td></tr></tbody></table> | | | Angle | Value | Reason | a | 120° | Co-int \angle s, $NM \parallel FG$ or \angle s on a str line | b | 105° | \angle s on a str line | c | 15° | given | d | 120° | \angle s on a str line or corresp \angle s, or co-int \angle s, $NM \parallel FG$ | v | 45° | ext \angle of \triangle or int \angle s \triangle | w | 75° | \angle s on a str line | x | 60° | corresp \angle s, $NM \parallel FG$ or \angle s on a str line | y | 60° | \angle s opp equal sides | z | 60° | int \angle s $\triangle MNK$ | 5) a) $\hat{L}_1 = 44^\circ$ vert opp \angle s $\hat{B}_1 = 68^\circ$ int \angle s \triangle OR $\hat{L}_2 = 136^\circ$ \angle s on a str line $\hat{B}_1 = 136^\circ - 68^\circ = 68^\circ$ ext \angle of $\triangle BFL$ b) $\hat{B}_2 = 44^\circ$ corresp \angle s, $SB \parallel EA$ OR $\hat{B}_2 = \hat{L}_1 = 44^\circ$ alt \angle s, $SB \parallel EA$ c) $\hat{G}_1 = 60^\circ$ \angle s on a str line OR $\hat{G}_1 = 180^\circ - 76^\circ - 44^\circ = 60^\circ$ int \angle s $\triangle LTG$  | |
| Angle | Value | Reason | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| a | 120° | Co-int \angle s, $NM \parallel FG$ or \angle s on a str line | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b | 105° | \angle s on a str line | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| c | 15° | given | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| d | 120° | \angle s on a str line or corresp \angle s, or co-int \angle s, $NM \parallel FG$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| v | 45° | ext \angle of \triangle or int \angle s \triangle | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| w | 75° | \angle s on a str line | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| x | 60° | corresp \angle s, $NM \parallel FG$ or \angle s on a str line | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| y | 60° | \angle s opp equal sides | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| z | 60° | int \angle s $\triangle MNK$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

#TRY–angles

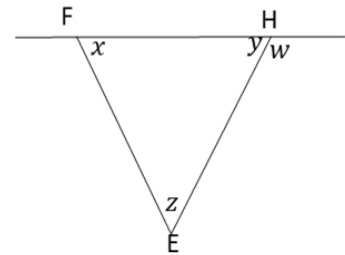
PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 3.8

This worksheet deals mainly with isosceles triangles and includes a question on sides opp equal angles.

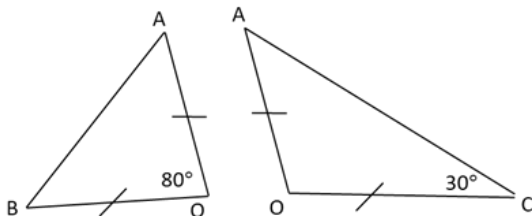
1) Use the diagram to answer the questions:

- If $FE = FH$:
 - Which angle values are equal?
 - $\triangle EFH$ is known as _____
- If $FE = FH = HE$, then $\triangle FEH$ is known as _____
- If $x = z$, which sides are equal?
- If $x = z$, what is the value of w ?

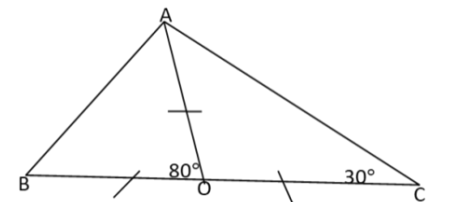


2)

- Given two triangles. Determine the 4 unknown angles.



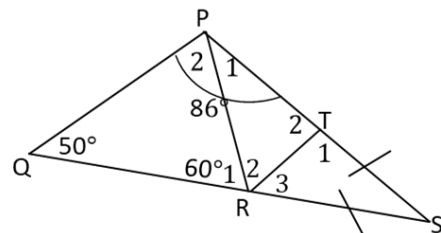
- If you now put the two triangles together, you get the following diagram:



Show that BOC is **NOT** a straight line.

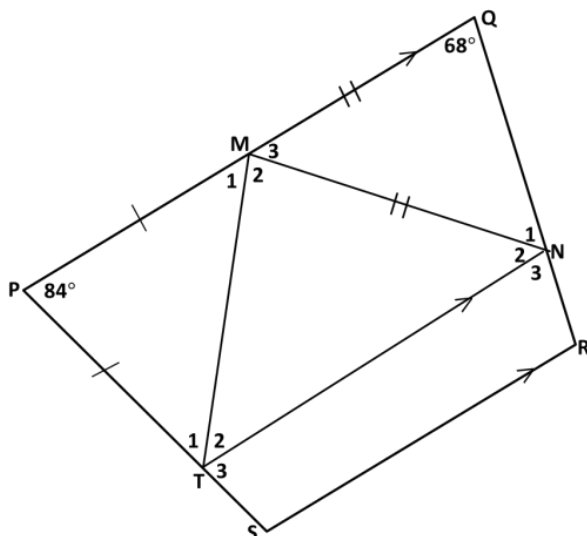
3) Given $\hat{Q} = 50^\circ$; $TS = RS$; $\hat{PRQ} = 60^\circ$ and $\hat{TPQ} = 86^\circ$.

- Determine \hat{S}
- Determine \hat{R}_3 and \hat{T}_1
- Determine \hat{TRP}
- Is $PQ \parallel TR$? Give a reason for your answer.



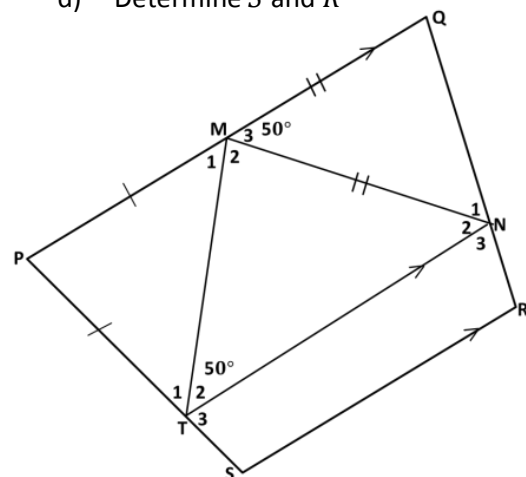
4) Given that $PQ \parallel SR \parallel TN$, $\hat{P} = 84^\circ$, $\hat{Q} = 68^\circ$, $PT = PM$ and $MQ = MN$.

- Determine \hat{T}_1 , \hat{N}_3 , and \hat{M}_3 in this order.
- Now try to determine all other unknown angles.



5) Given $PQ \parallel ZN \parallel SR$, $\hat{T}_2 = \hat{M}_3 = 50^\circ$, $PT = PM$ and $MQ = MN$

- Show that $MT = MN$
- Determine \hat{M}_2
- What type of triangle is MTN ?
- Determine \hat{S} and \hat{R}

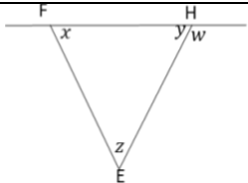
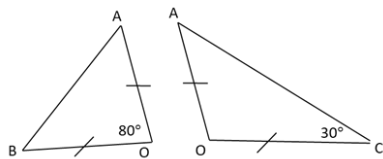
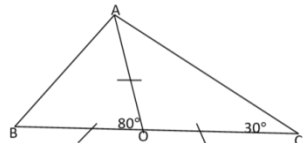
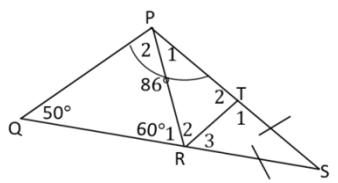


#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 3.8

Answers

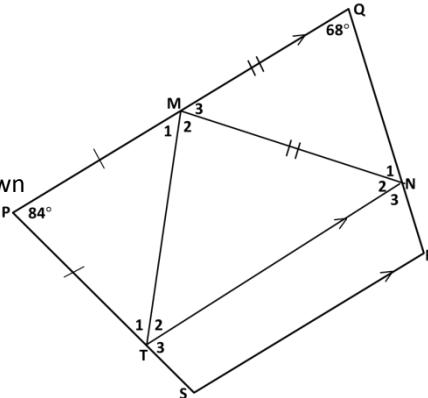
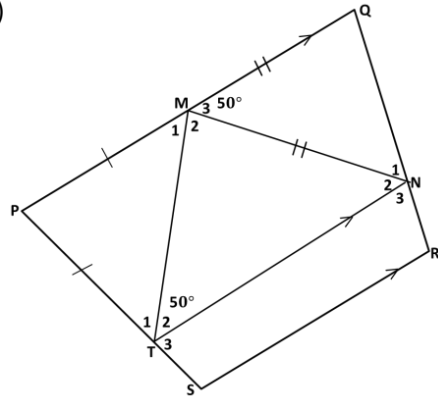
| Question | Answer |
|--|---|
| <p>1) Use the diagram to answer the questions</p>  <p>a) If $FE = FH$:</p> <ol style="list-style-type: none"> Which angles values are equal? $\triangle FEH$ is known as _____ <p>b) If $FE = FH = HE$, then $\triangle FEH$ is known as _____</p> <p>c) If $x = z$, which sides are equal?</p> <p>d) If $x = z$, what is the value of w?</p> | <p>1)</p> <p>a)</p> <ol style="list-style-type: none"> $x = y$ An isosceles Δ <p>b) An equilateral Δ</p> <p>c) $FH = HE$</p> <p>d) $w = 2x$ or $w = 2z$</p> |
| <p>2) Given two triangles.</p> <p>a) Determine the 4 unknown angles.</p>  <p>b) If you put the two triangles together, you get the following diagram:</p>  <p>Show that BOC is NOT a straight line.</p> | <p>2)</p> <p>Reasons are not expected for a.</p> <p>a) $\hat{A} = \hat{B}$ \angles opp equal sides $= (180^\circ - 80^\circ) \div 2$ $= 50^\circ$ int \angles Δ $\hat{A} = \hat{C} = 30^\circ$ \angles opp equal sides $\hat{O} = 120^\circ$ int \angles Δ</p> <p>b) $75^\circ + 80^\circ = 155^\circ \neq 180^\circ$ So BOC is not a straight line. The adjacent \angles are not supplementary</p> |
| <p>3) Given that $\hat{Q} = 50^\circ$; $TS = RS$; $\hat{PRQ} = 60^\circ$ and $\hat{TPQ} = 86^\circ$</p> <p>a) Determine \hat{S}</p> <p>b) Determine \hat{R}_3 and \hat{T}_1</p> <p>c) Determine \hat{TRP}</p> <p>d) Is $PQ \parallel TR$? Give a reason for your answer</p>  | <p>3) Reasons are not expected for a to c.</p> <p>a) $\hat{S} = 180^\circ - 86^\circ - 50^\circ$ int \angles Δ $= 44^\circ$</p> <p>b) $\hat{R}_3 = \hat{T}_1$ \angles opp equal sides $= (180^\circ - 44^\circ) \div 2$ $= 68^\circ$ int \angles Δ</p> <p>c) $\hat{TRP} = 180^\circ - 60^\circ - 68^\circ$ $= 52^\circ$ \angles on a str line</p> <p>d) $PQ \nparallel TR$ Corresponding angles \hat{R}_3 and \hat{Q} are not equal in size.</p> |

#TRY–angles

PRACTICE IN SOLVING GEOMETRY PROBLEMS

Worksheet 3.8

Answers continued

| Question | Answer |
|--|--|
| <p>4) Given that $PQ \parallel SR \parallel TN$, $\hat{P} = 84^\circ$, $\hat{Q} = 68^\circ$, $PT = PM$ and $MQ = MN$.</p> <p>a) Determine \hat{T}_1, \hat{N}_3, and \hat{M}_3 in this order.</p> <p>b) Now try to determine all other unknown angles.</p>  | <p>4) Reasons are not expected</p> <p>a) $\hat{T}_1 = \hat{M}_1$ \angles opp equal sides $= 48^\circ$ $\text{int} \angle$s Δ $\hat{N}_3 = 68^\circ$ $\text{corresp } \angle$s, $PQ \parallel TN$ $\hat{M}_3 = 56^\circ$ \angles opp equal sides; $\text{int} \angle$s Δ</p> <p>b) $\hat{M}_2 = 56^\circ$ \angles on a str line $\hat{N}_2 = 56^\circ$ $\text{alt } \angle$s, $PQ \parallel TN$ OR $\text{int} \angle$s Δ $\hat{R} = 112^\circ$ $\text{co-int } \angle$s, $PQ \parallel SR$ OR $TN \parallel SR$ $\hat{T}_3 = 84^\circ$ $\text{corresp } \angle$s, $PQ \parallel TN$ OR \angles on a str line $\hat{S} = 96^\circ$ $\text{co-int } \angle$s, $PQ \parallel SR$ OR $TN \parallel SR$</p> |
| <p>5)</p>  <p>Given $PQ \parallel SR \parallel TN$, $\hat{T}_2 = \hat{M}_3 = 50^\circ$, $PT = PM$ and $MQ = MN$</p> <p>a) Show that $MT = MN$</p> <p>b) Determine \hat{M}_2</p> <p>c) What type of triangle is MTN?</p> <p>d) Determine \hat{S} and \hat{R}</p> | <p>5) Reasons are not expected for b to d</p> <p>a) $\hat{M}_3 = \hat{N}_2$ $\text{alt } \angle$s, $PQ \parallel TN$ $\hat{M}_3 = \hat{T}_2 = 50^\circ$ given So $\hat{N}_2 = \hat{T}_2$ and $MT = MN$ $\text{sides opp equal } \angle$s</p> <p>b) $\hat{M}_2 = 80^\circ$ \angles opp equal sides; $\text{int} \angle$s Δ</p> <p>c) MTN is an isosceles Δ</p> <p>d) $\hat{M}_1 = 50^\circ$ $\text{alt } \angle$s, $PQ \parallel TN$ $\hat{T}_1 = 50^\circ$ \angles opp equal sides $\hat{P} = 80^\circ$ $\text{int } \angle$s Δ $\hat{S} = 100^\circ$ $\text{co-int } \angle$s, $PQ \parallel SR$ $\hat{Q} = \hat{N}_1$ \angles opp equal sides $= 65^\circ$ $\text{int} \angle$s Δ $\hat{R} = 115^\circ$ $\text{co-int } \angle$s, $PQ \parallel SR$</p> |