1. The diagram shows a triangle.

Find the value of $x$.

Give a reason for each step of your working.

$$180 - 40 = 140^\circ \quad (\text{angles in a triangle add to } 180^\circ)$$
$$140 \div 2 = 70^\circ \quad (2 \text{ angles in an isosceles triangle are equal})$$

$x = 70^\circ$ [3]

2. PQRS is a rectangle.

A, B, C and D are points on SP, PQ, QR and RS respectively.

AC is the line of symmetry for the diagram.
(a) Angle ABC = 125°.

Write down the size of angle ADC.

(a) Angle ADC = ...................... ° [1]

(b) AP is the same length as PB.

Work out the size of angle BCD.

Show your reasoning clearly.

\[ x = 2 \times 10^\circ \]

(b) Angle BCD = ...................... ° [4]

3. ABCD is a trapezium.

Work out

(a) angle EBC,

(b) angle ADE.

4. The angles in a triangle are in the ratio 1 : 2 : 3.

Neil says

This is a right-angled triangle.

Is Neil correct?

Show your reasoning.

\[ 6x = 180 \]

\[ x = 30 \]

size of angles are 30°, 60° and 90° so yes it is right angled.

[3]
5. Here is a diagram.

\[
\begin{align*}
\text{Not to scale} \\
70° + 30° &= 100° \\
180° - 100° &= 80° \\
180° - 30° &= 150°
\end{align*}
\]

(a) Work out angle \(a\).

\[a = \frac{80°}{1} \]

(b) Work out angle \(b\).

\[b = \frac{180°}{1} \]

6. ABE and CBD are straight lines.

Show that triangle \(ABC\) is an isosceles triangle.

Give a reason for each stage of your working.

\[
\begin{align*}
\hat{A}BC &= 80° \quad \text{(vertically opposite angles are equal)} \\
\hat{A}CB &= \frac{50° + 80°}{1} = 130° \\
180° - 130° &= 50° \quad \text{(angles in a triangle = 180°)} \\
\text{so } \hat{BAC} &= \hat{BCA} \quad \because \text{the triangle is an isosceles triangle.}
\end{align*}
\]
7. WXYZ is a quadrilateral.

XYV is a straight line.

(a) (i) Find the size of the angle marked a.

\[ 33^\circ \]

(ii) Give a reason for your answer.

\[ \text{Angles on a straight line add up to } 180^\circ \]

Angle ZWX = angle WXY

(b) Work out the size of angle ZWX.

\[ 145^\circ + 33^\circ - \frac{180^\circ}{2} = 91^\circ \]

\[ 91^\circ \]

8. ABC is a straight line.

BCD is a triangle.

ABDE is a quadrilateral.

(a) (i) Work out the value of x.

\[ 115^\circ \]

(ii) Give a reason for your answer.

\[ \text{Angles in a triangle add up to } 180^\circ \]
(b) Work out the value of \( y \).

9. AB is a straight line.

Work out the size of angle \( x \). \( x = 112^\circ \)

10. Polygon ABCDE is divided into triangles as shown.

Use the triangles to work out the sum of the interior angles of polygon ABCDE. You must show your working.

\[
\text{sum of interior angles} = 180 \times 3 = 540^\circ
\]
11. In the diagram, DC is parallel to AB.
Show that triangle ABD is isosceles.

\[
\begin{align*}
\angle CDB &= 180 - (100 + 52) \\
&= 28^\circ \\
\angle DBA &= 28^\circ \\
\angle ADB &= 180 - (124 + 28) \\
&= 28^\circ \\
\angle ABD &= 28^\circ \\
\therefore \angle ADB &= \angle ABD
\end{align*}
\]

12. In the diagram below, ABD is a straight line.
\(\angle A\hat{C}B = 80^\circ\) and \(\angle C\hat{B}D = 130^\circ\).
Show that triangle \(ABC\) is an isosceles triangle.
You must explain your reasoning.
\[
\begin{align*}
\angle C\hat{B}A &= 180 - 130 = 50^\circ \\
\angle C\hat{A}B &= 180 - (80 + 50) \\
&= 50^\circ \\
\therefore \angle C\hat{B}A &= \angle C\hat{A}B \\
\therefore \text{the triangle is isosceles}
\end{align*}
\]
13. The diagram shows a regular octagon and a regular hexagon.

Find the size of the angle marked $x$
You must show all your working.

$$\begin{array}{c}
8 \div 135 = \frac{1}{8} \\
6 \div 120 = \frac{1}{6}
\end{array}$$

$$\begin{align*}
120 + 135 &= 255 \\
360 - 255 &= 105°
\end{align*}$$

$x = 105°$ \[3\]

14. ABC is an isosceles triangle with $BA = BC$. \[this is important!\]

D lies on AC.
ABD is an isosceles triangle with $AB = AD$.
Angle $ABD = 72°$
Show that the triangle $BCD$ is isosceles.
You must give a reason for each stage of your working.

$$\begin{align*}
\hat{BDA} &= ABD \quad (ABD) \text{ is isosceles} \\
\hat{BDC} &= 180 - 72 = 108° \quad \text{angles on a straight line} = 180°
\end{align*}$$

$$\begin{align*}
\hat{BAD} &= 180 - (72 + 72) = 180 - 144 = 36° \\
\hat{BCD} &= 36° \quad \text{(same as } \hat{BAD}) \\
\hat{DBC} &= 180 - (108 + 36) = 36° \quad \text{DBC} = DCB = 36° \quad \text{it is an isosceles triangle}
\end{align*}$$
15. The diagram shows a right-angled triangle.

All the angles are in degrees.
Work out the size of the smallest angle of the triangle.

\[
7x + 5x + 18 + 90 = 180 \\
12x + 108 = 180 \\
12x = 180 - 108 \\
12x = 72 \\
x = \frac{72}{12} = 6
\]

The smallest angle = 42°

16. ABC is a right-angled triangle.

P is a point on AB.
Q is a point on AC.
AP = AQ.
Work out the size of angle AQP.
You must give a reason for each stage of your working.

\[\hat{AQP} = \hat{AQ} \]
\[180 - 68 = 112 \]
\[\frac{112}{2} = 56 \]

\[\hat{AQP} = 56°\]
17. ABC is an isosceles triangle.

When angle A = 70°, there are 3 possible sizes of angle B.

(a) What are they?

\[\begin{align*}
180 - 70 &= 110 \\
110 \div 2 &= 55°
\end{align*}\]

\[\begin{align*}
\ldots\ldots\ldots\ldots°, \ldots\ldots\ldots\ldots°, \ldots\ldots\ldots\ldots°
\end{align*}\]

When angle A = 120°, there is only one possible size of angle B.

(b) Explain why.

A cannot be the angle that is equal to another angle as angles in a triangle cannot be bigger than 180°.

18. The diagram shows a triangle ACD and an equilateral triangle BCD.

\[\begin{align*}
120 + 40 &= 160 \\
180 - 160 &= 10°
\end{align*}\]

Work out the size of angle x.

\[x = 20°\]
19. The diagram shows a parallelogram $ABCD$.

$P$ is a point on $BC$.

a) Work out the size of angle $x$.

You must show your working, which may be on the diagram.

$x = 85^\circ$  \hspace{1cm} [3]

b) Work out the size of angle $y$.

$y = 15^\circ$  \hspace{1cm} [1]
CREDITS AND NOTES

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Notes:
These questions have been retyped from the original sample/specimen assessment materials and whilst every effort has been made to ensure there are no errors, any that do appear are mine and not the exam board's (similarly any errors I have corrected from the originals are also my corrections and not theirs!).

Please also note that the layout in terms of fonts, answer lines and space given to each question does not reflect the actual papers to save space.

These questions have been collated by me as the basis for a GCSE working party set up by the GLOW maths hub - if you want to get involved please get in touch. The objective is to provide support to fellow teachers and to give you a flavour of how different topics “could” be examined. They should not be used to form a decision as to which board to use. There is no guarantee that a topic will or won’t appear in the “live” papers from a specific exam board or that examination of a topic will be as shown in these questions.

Links:
AQA  http://www.aqa.org.uk/subjects/mathematics/gcse/mathematics-8300
OCR  http://ocr.org.uk/gcsemaths
WJEC Eduqas http://www.eduqas.co.uk/qualifications/mathematics/gcse/

Contents:
This version contains questions from:
AQA – Sample Assessment Material, Practice set 1 and Practice set 2
OCR – Sample Assessment Material and Practice set 1
Pearson Edexcel – Sample Assessment Material, Specimen set 1 and Specimen set 2
WJEC Eduqas – Sample Assessment Material