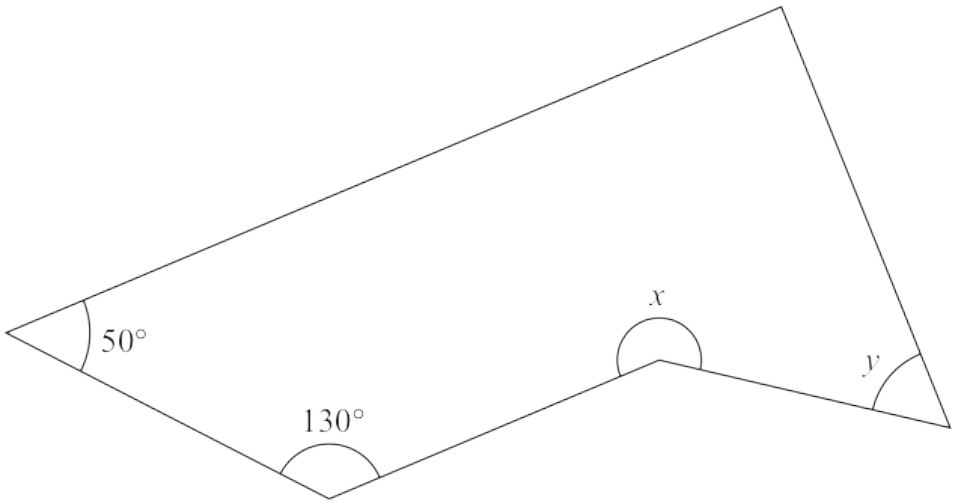
5.3 Angle Properties,Polygons and Parallel Lines

Mr Faruk
Teacher of Mathematics
BSc/MSc/PGCE Mathematics
cieigcsesolutions@gmail.com

4 Here is a shape.



(a) What type of angle is the angle marked x?

.....

(1)

(b) Measure the size of the angle marked y.

..... °

(1)

(c) On the diagram, mark with arrows (>>) the pair of parallel lines.

(1)

11

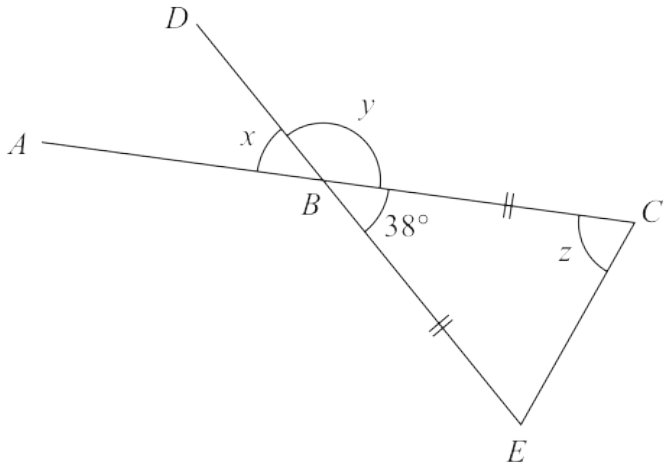


Diagram **NOT** accurately drawn

ABC and *DBE* are straight lines.

(a) Find the size of angle *x*.

.....°

(1)

(b) (i) Work out the size of angle *y*.

.....°

(ii) Give a reason for your answer.

.....

(2)

BC = *BE*

(c) Work out the size of angle *z*.

.....°

(2)

10 Here is a quadrilateral.

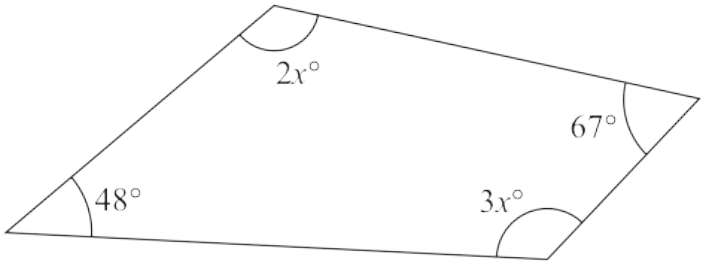


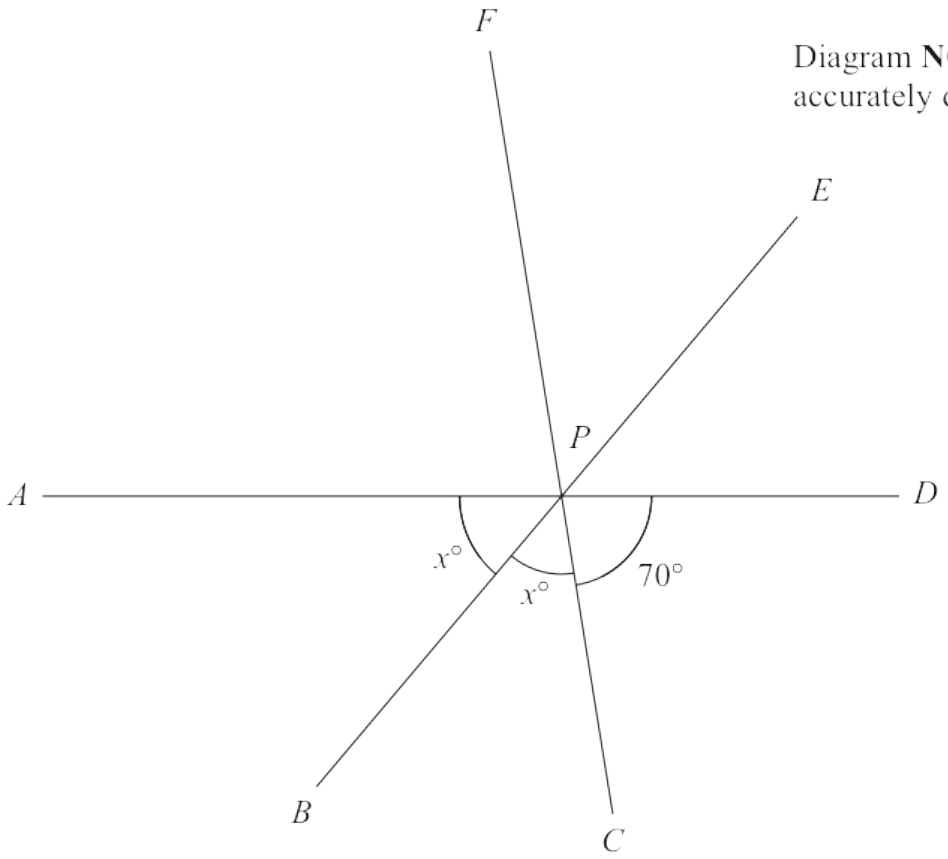
Diagram **NOT** accurately drawn

Work out the value of x.

.....

(Total for Question 10 is 3 marks)

12



APD, *BPE* and *CPF* are straight lines.

Angle *CPD* = 70°
Angle *APB* = angle *BPC* = x°

(a) Find the size of angle *FPA*.

.....°

(1)

(b) Work out the value of x.

.....

(2)

15 $ABCD$ is a parallelogram.

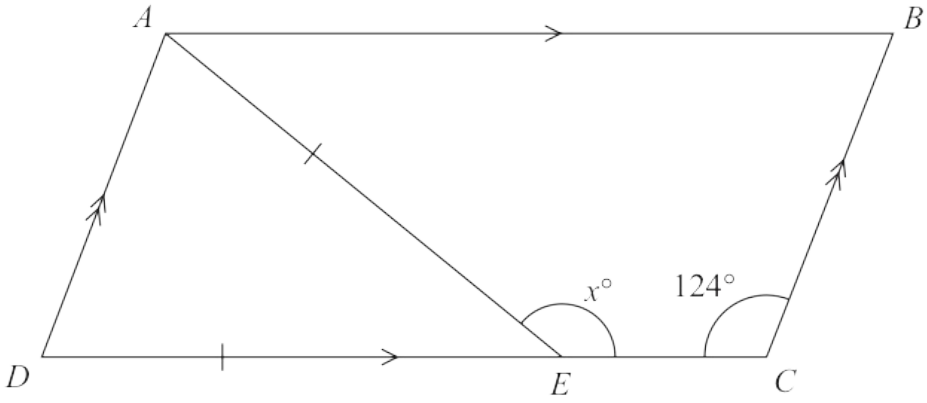


Diagram **NOT** accurately drawn

Angle $DCB = 124°$
E is the point on DC such that $AE = DE$.
Angle $AEC = x°$

Work out the value of x.

(Total for Question 15 is 4 marks)

8

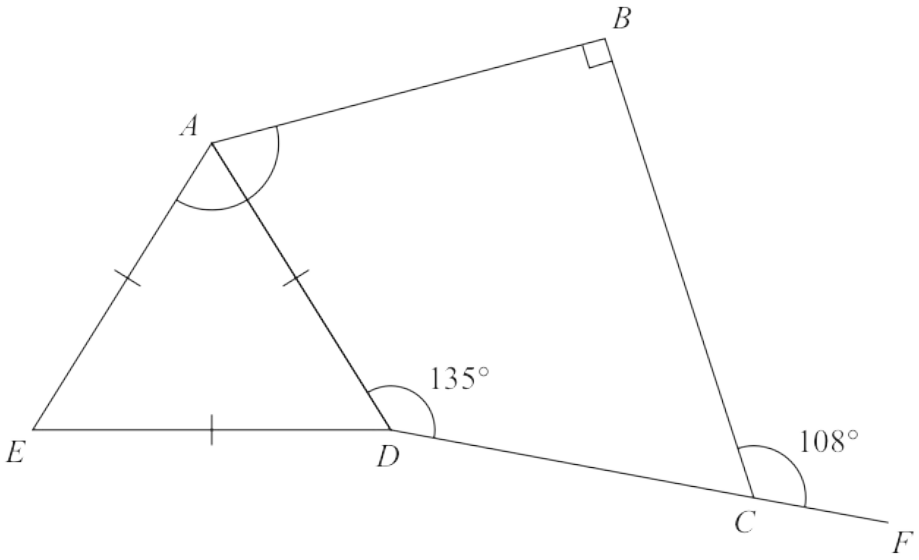


Diagram **NOT** accurately drawn

ABCD is a quadrilateral.
ADE is an equilateral triangle.
DCF is a straight line.

Work out the size of angle *EAB*.
Give a reason for each stage of your working.

.....°

(Total for Question 8 is 5 marks)

15

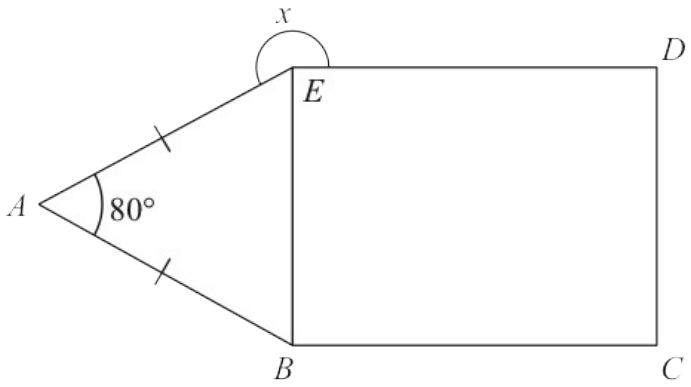


Diagram **NOT** accurately drawn

BCDE is a rectangle.
ABE is an isosceles triangle.

$AB = AE$
Angle $BAE = 80°$

Work out the size of angle x.

°

(Total for Question 15 is 3 marks)

12

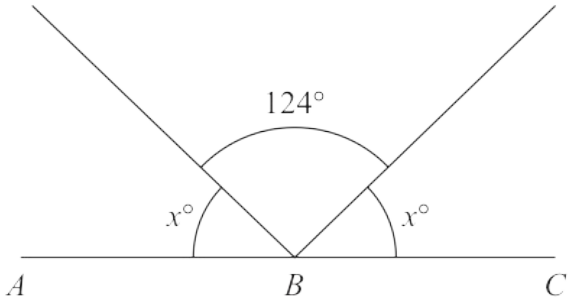


Diagram **NOT** accurately drawn

ABC is a straight line.
Work out the value of x.

$x =$ .....

(Total for Question 12 is 3 marks)

21

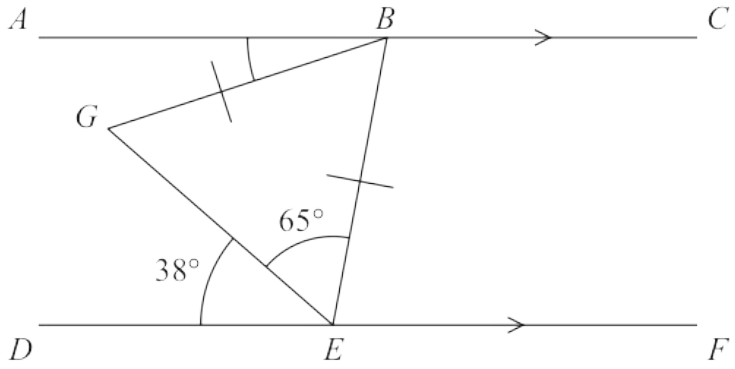


Diagram **NOT** accurately drawn

ABC and *DEF* are parallel lines.

BG = *BE*
Angle *DEG* = 38°
Angle *GEB* = 65°

Find the size of angle *ABG*.

.....°

(Total for Question 21 is 3 marks)

24

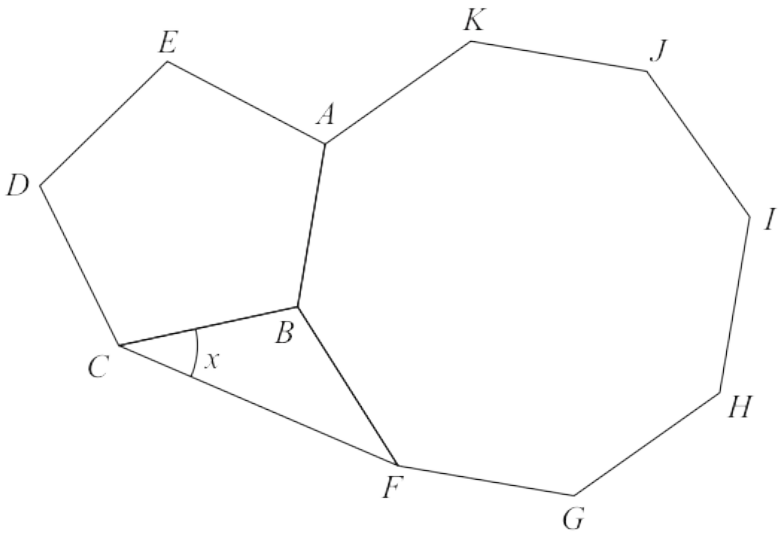


Diagram **NOT** accurately drawn

The diagram shows a regular pentagon, *ABCDE*, a regular octagon, *ABFGHIJK*, and an isosceles triangle, *BCF*.

Work out the size of angle x.

.....°

13

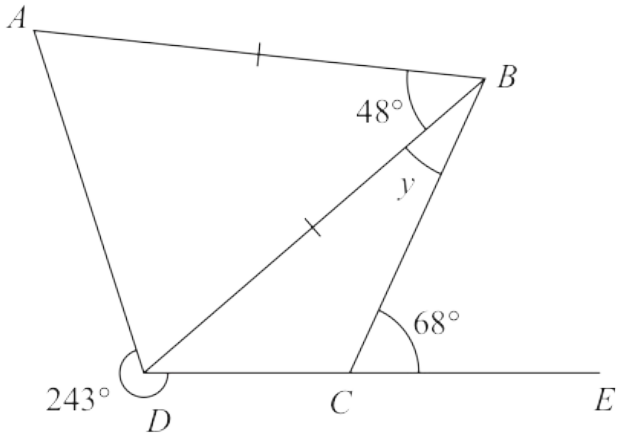


Diagram **NOT** accurately drawn

ABD is an isosceles triangle with $AB = DB$.
DCE is a straight line.

Angle $ABD = 48°$
Angle $BCE = 68°$
Reflex angle $ADC = 243°$

Work out the size of the angle marked y.
Give a reason for each stage in your working.

°

(Total for Question 13 is 5 marks)

21 The diagram shows the triangle PQR.

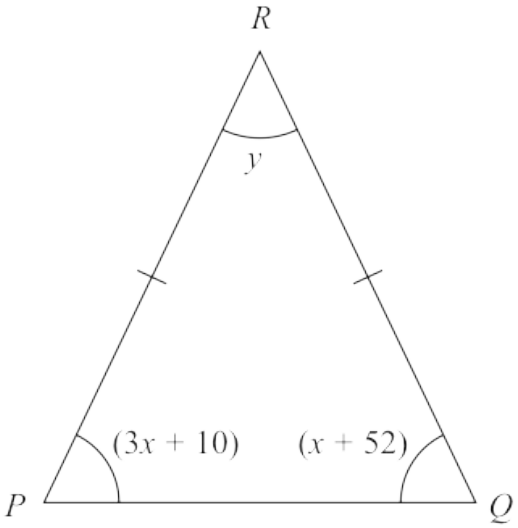


Diagram **NOT** accurately drawn

In the diagram, all the angles are in degrees.

$RP = RQ$

Find the value of y.
Show clear algebraic working.

$y =$

(Total for Question 21 is 4 marks)

10 Here is a sketch of triangle ABC.

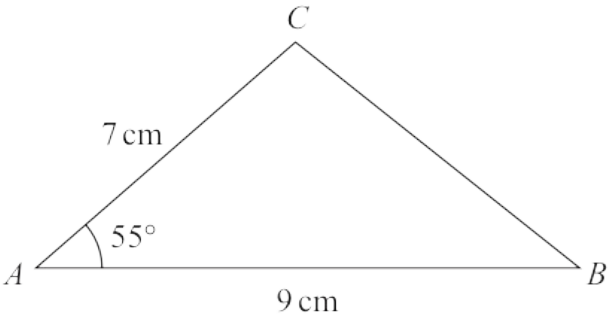
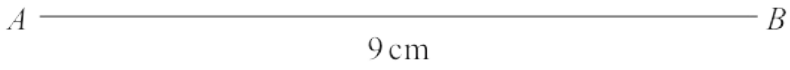


Diagram **NOT** accurately drawn

In the space below, make an accurate drawing of triangle ABC.
The line AB has been drawn for you.



(Total for Question 10 is 2 marks)

14

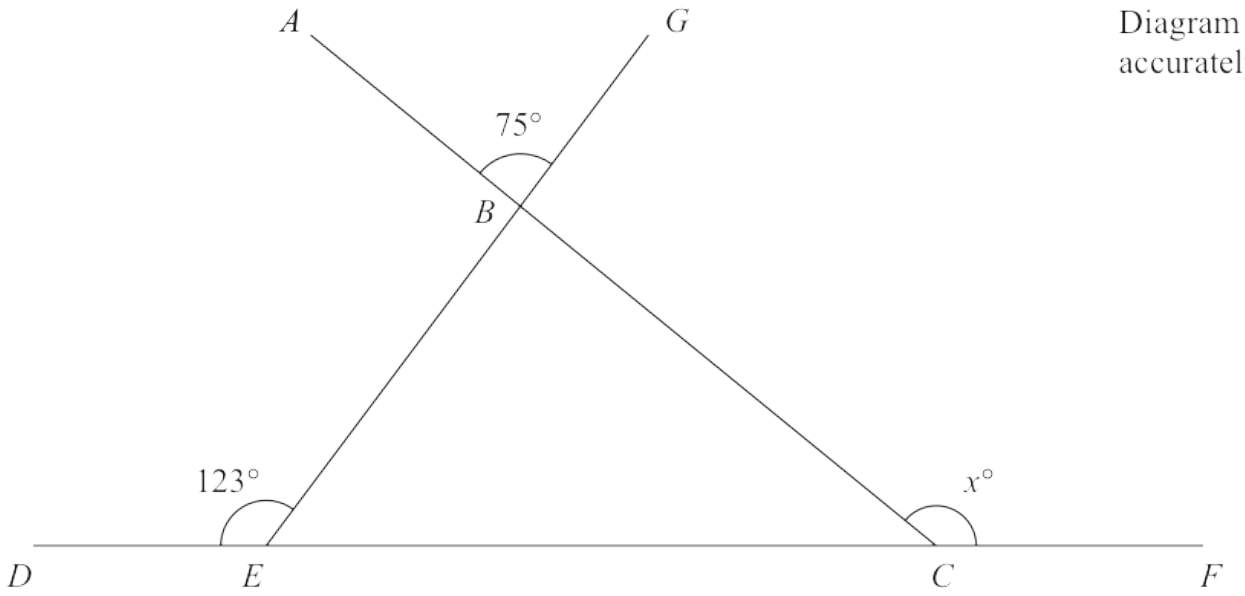


Diagram **NOT** accurately drawn

ABC, *DECF* and *EBG* are straight lines.

Work out the value of x.
Give a reason for each stage of your working.

$x =$

(Total for Question 14 is 4 marks)

23

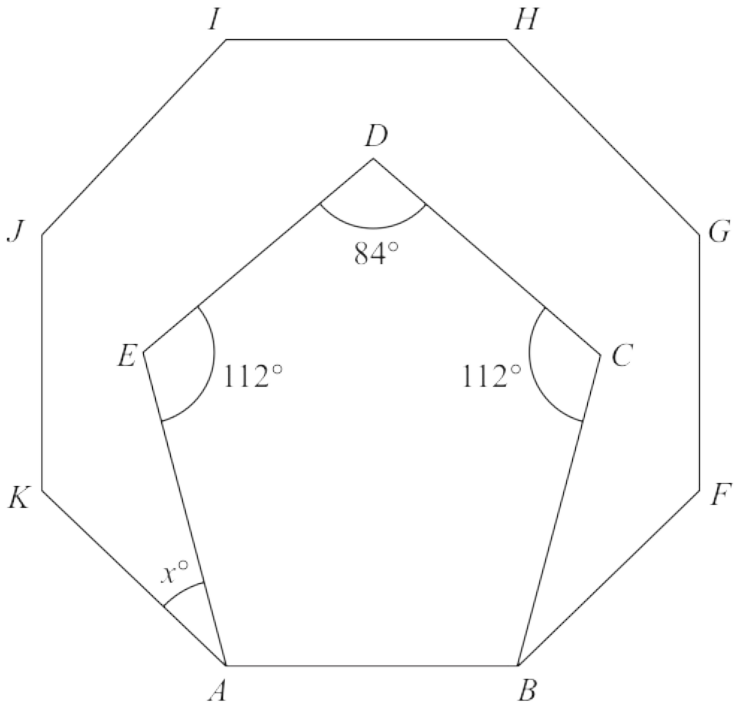


Diagram **NOT** accurately drawn

Pentagon *ABCDE* is drawn inside the regular octagon *ABFGHIJK*.
The pentagon has exactly one line of symmetry.

Work out the value of x.

$x =$

(Total for Question 23 is 4 marks)

8 The diagram shows two triangles, CDB and BDA.

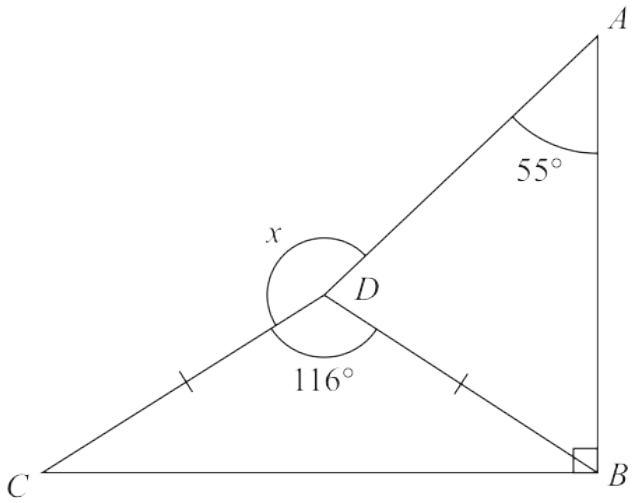


Diagram **NOT** accurately drawn

$DC = DB$
Angle $ABC = 90°$
Angle $CDB = 116°$
Angle $DAB = 55°$

Work out the size of the angle marked x.
Give a reason for each stage of your working.

.....°

.....

(Total for Question 8 is 5 marks)

June 2019 1F

13 Each exterior angle of a regular polygon is 24°

Work out the number of sides of the polygon.

.....

(Total for Question 13 is 2 marks)

June 2019 1FR

16 Each interior angle of a regular polygon is 162°

Work out the number of sides the polygon has.

.....

(Total for Question 16 is 3 marks)

10 The diagram shows kite $ABCD$.

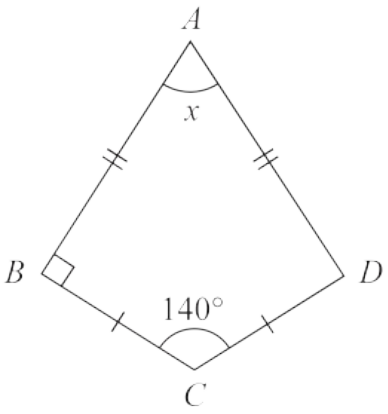


Diagram **NOT** accurately drawn

(a) Work out the size of the angle marked x.

..... °

(2)

The diagram shows kite $PQRS$.

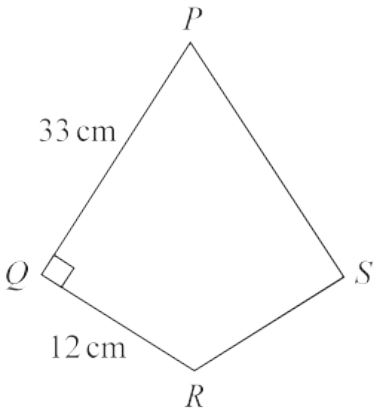


Diagram **NOT** accurately drawn

(b) Work out the area of kite $PQRS$.

..... cm^2

(2)

7

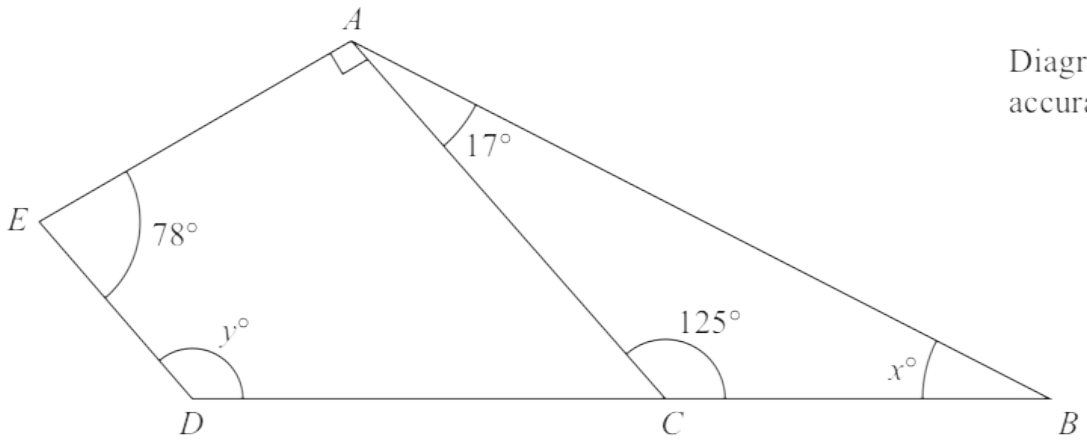


Diagram **NOT** accurately drawn

ABDE is a quadrilateral.
ABC is a triangle.
DCB is a straight line.

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

$x =$ .....

(1)

(ii) Give a reason for your answer.

.....

(1)

(b) Work out the value of y.
Give a reason for each stage of your working.

$y =$ .....

(3)

15 A regular polygon has n sides.
The size of each interior angle of the regular polygon is 140°

Work out the value of n.

$n =$ .....

(Total for Question 15 is 3 marks)

20 The diagram shows a triangle.

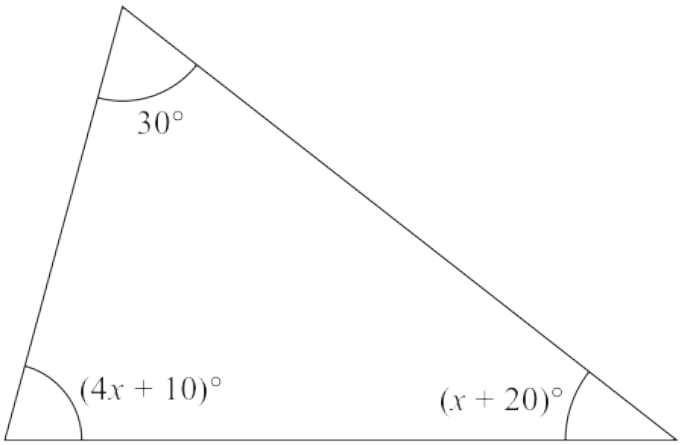


Diagram **NOT** accurately drawn

Work out the value of x.

$x =$ .....

(Total for Question 20 is 4 marks)

15

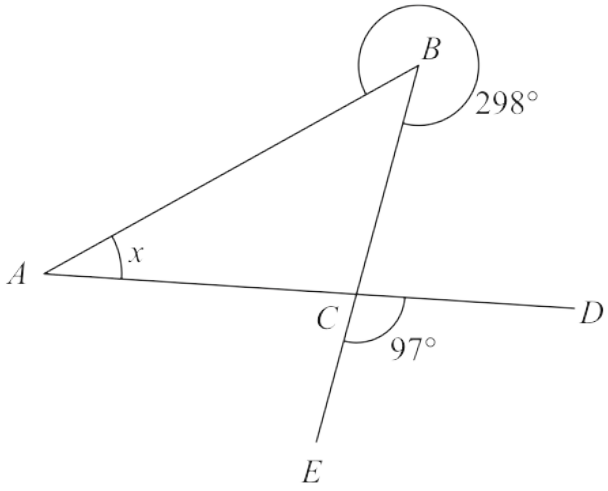


Diagram **NOT** accurately drawn

ABC is a triangle.
D and *E* are points such that *ACD* and *BCE* are straight lines.

reflex angle *ABC* = 298°
angle *ECD* = 97°

Work out the size of angle *x*.
Give a reason for each stage of your working.

x = ... °

(Total for Question 15 is 4 marks)

26 The diagram shows two congruent isosceles triangles and parts of two congruent regular polygons, **X** and **Y**.

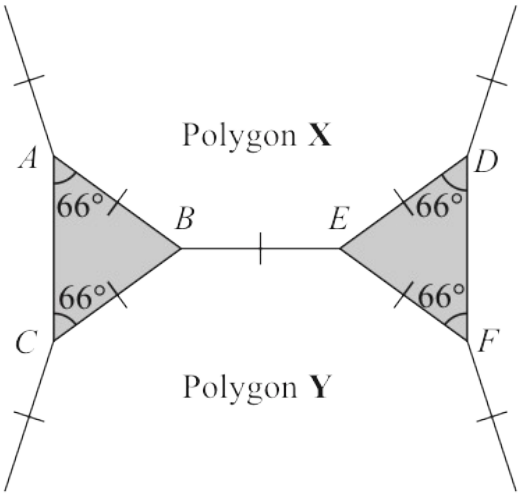


Diagram **NOT** accurately drawn

The two regular polygons each have n sides.

Work out the value of n.

$n =$ .....

(Total for Question 26 is 3 marks)

21 Here is a 10-sided polygon.

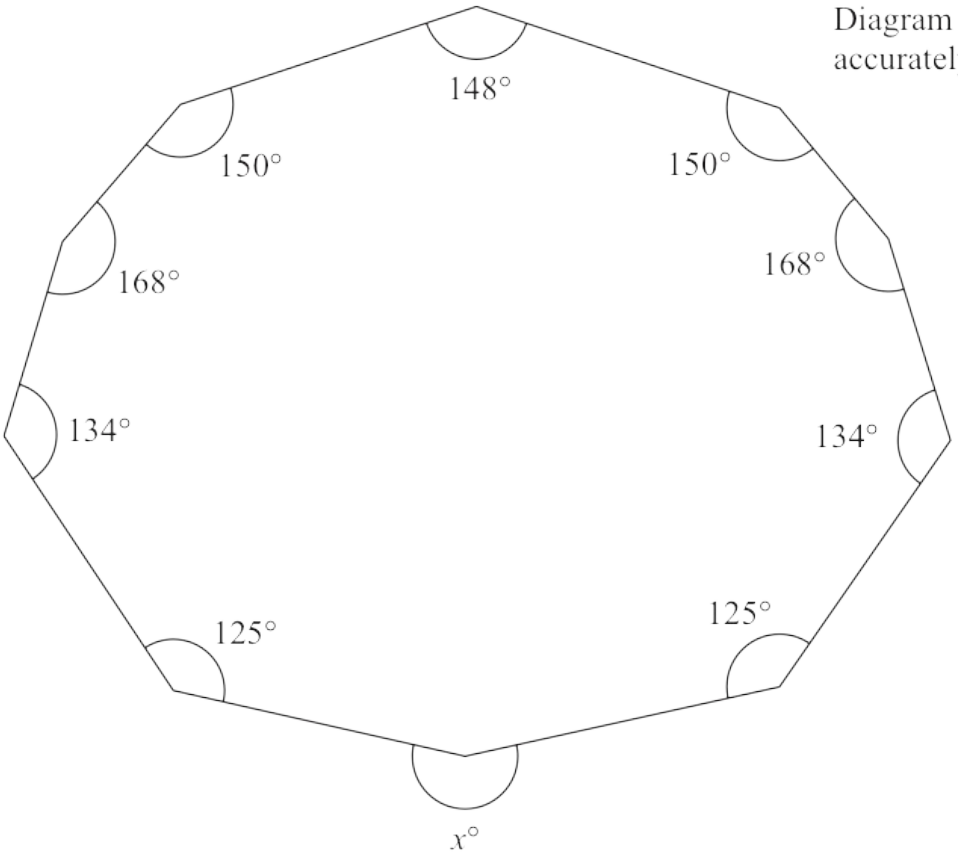


Diagram **NOT** accurately drawn

Work out the value of x.

$x =$ .....

18

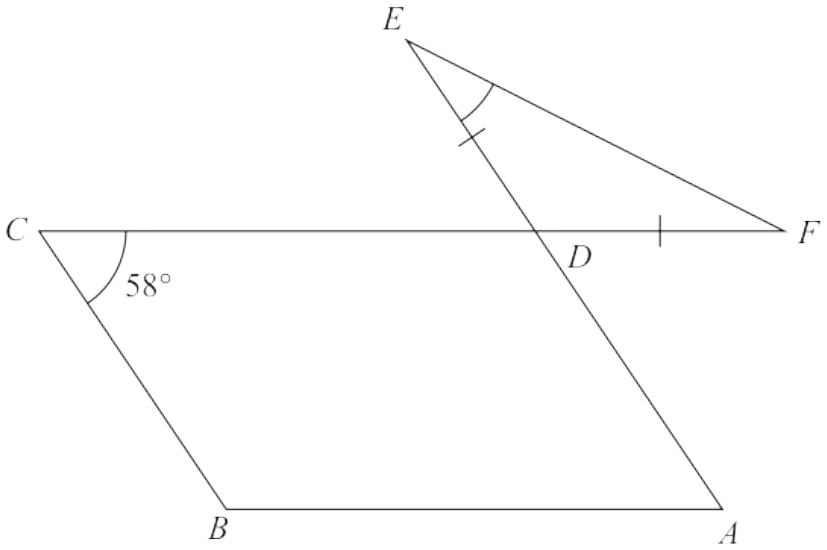


Diagram **NOT** accurately drawn

The diagram shows a parallelogram $ABCD$ and an isosceles triangle DEF in which $DE = DF$

CDF and ADE are straight lines.
Angle $BCD = 58°$

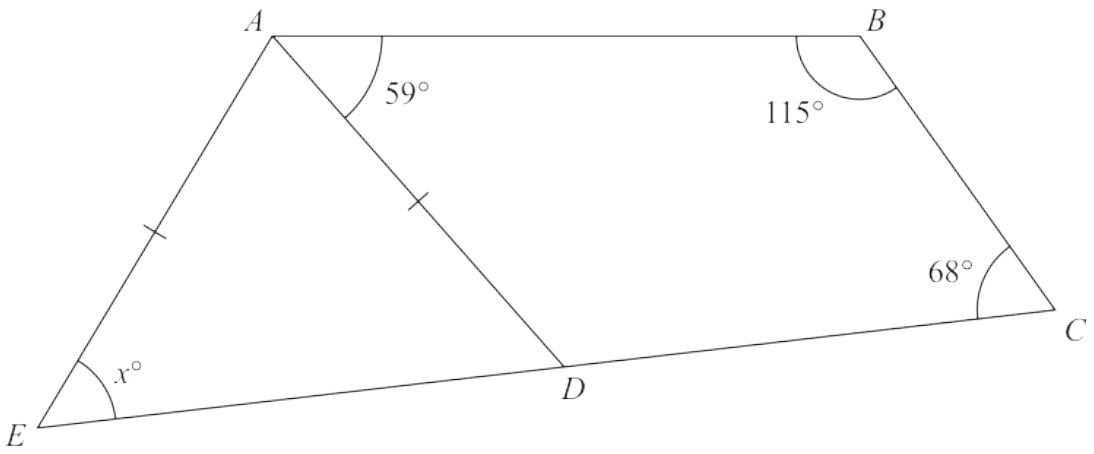
Work out the size of angle DEF.
Give a reason for each stage of your working.

.....°

.....

(Total for Question 18 is 5 marks)

9 The diagram shows quadrilateral $ABCD$ and isosceles triangle ADE, where $AE = AD$.



EDC is a straight line.

Work out the value of x.
Give a reason for each stage of your working.

$x =$ .....

(Total for Question 9 is 4 marks)

11

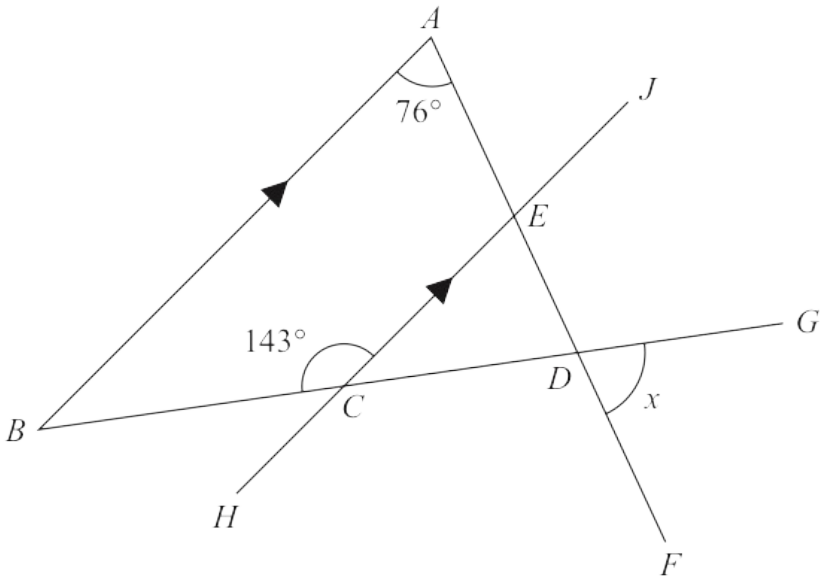


Diagram **NOT** accurately drawn

ABD is a triangle.

AEDF, *BCDG* and *HCEJ* are straight lines.
BA is parallel to *HCEJ*.

Work out the size of the angle marked x.

.....°

(Total for Question 11 is 3 marks)

10 The diagram shows the isosceles triangle ABC in which $AB = AC$

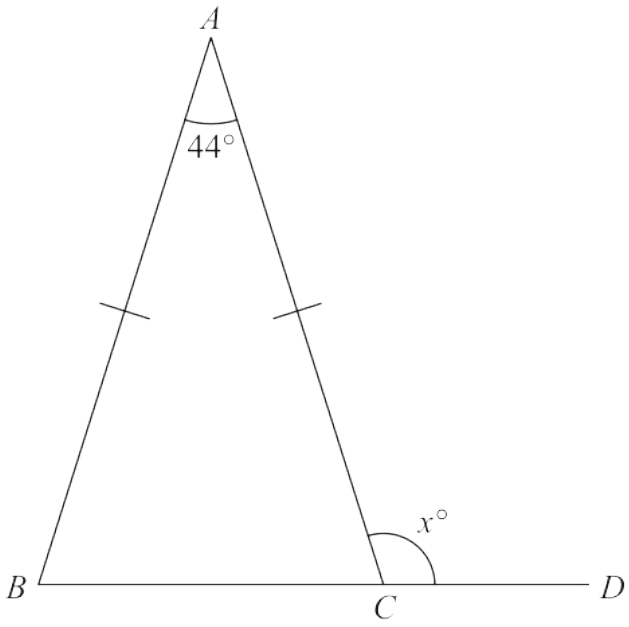


Diagram **NOT** accurately drawn

BCD is a straight line.

Work out the value of x.

$x =$ .....

(Total for Question 10 is 3 marks)

23 The diagram shows a regular pentagon, *ABCDE*, a regular hexagon, *CFGHID*, and a quadrilateral, *EDIJ*.

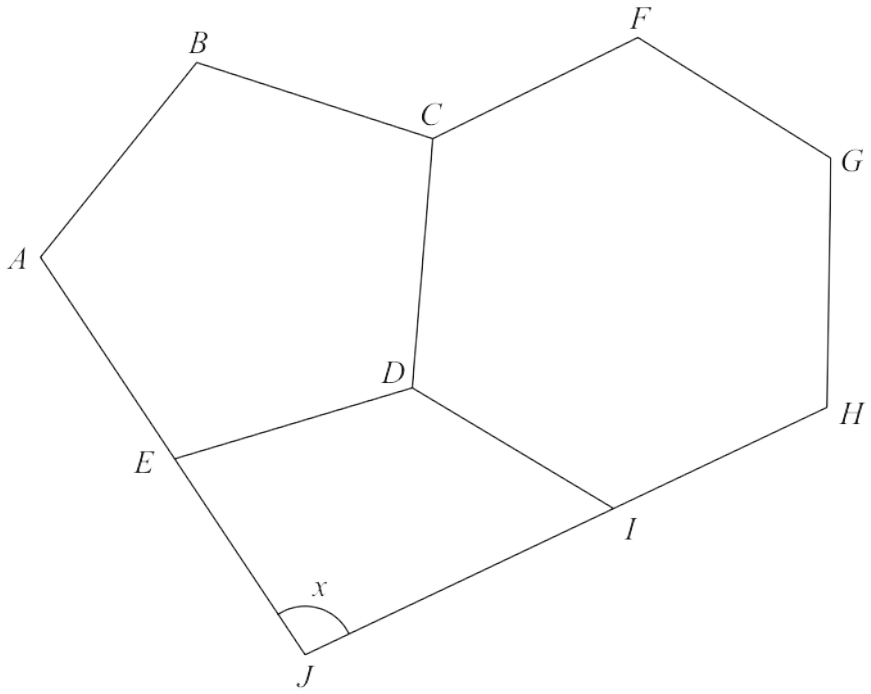


Diagram **NOT** accurately drawn

AEJ and *HIJ* are straight lines.

Work out the size of the angle marked *x*.
Show your working clearly.

.....°

(Total for Question 23 is 5 marks)

11 The diagram shows a square $ABCD$ and a regular pentagon $CDEFG$.

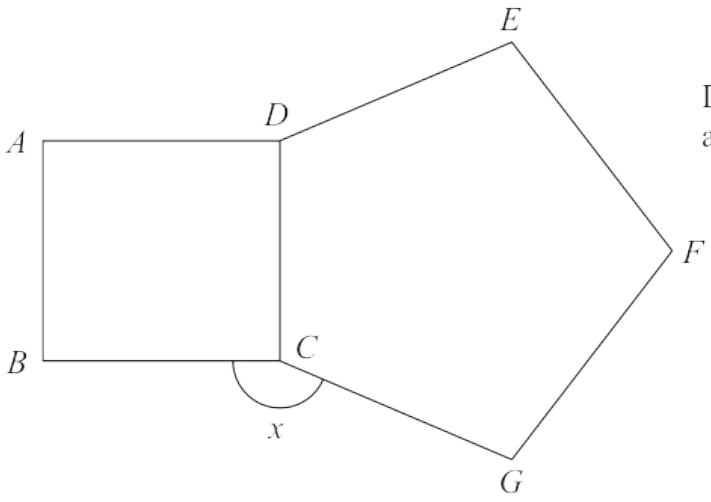


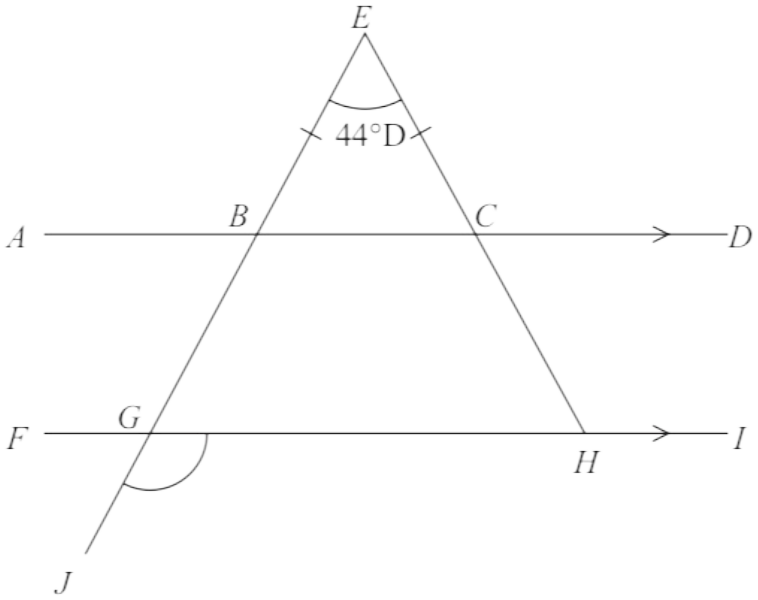
Diagram **NOT** accurately drawn

Work out the size of the angle marked x.

.....°

(Total for Question 11 is 3 marks)

19



iagram **NOT**
accurately drawn

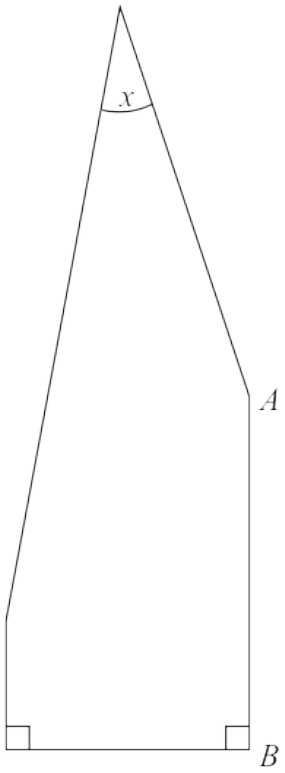
ABCD and *FGHI* are parallel straight lines.
EBGJ and *ECH* are straight lines.

BE = *CE*
Angle *BEC* = 44°

Work out the size of angle *JGH*.
Give a reason for each stage of your working.

°**(Total for Question 19 is 5 marks)**

4 The diagram shows a 5-sided polygon.



(a) Measure the length of the side AB
Give the units of your answer.

.....

(2)

(b) Measure the size of the angle marked x

..... °

(1)

(c) On the diagram, mark with arrows (>>) a pair of parallel sides.

(1)

(d) Write down the mathematical name of a 5-sided polygon.

.....

(1)

9 The diagram shows triangle ABD

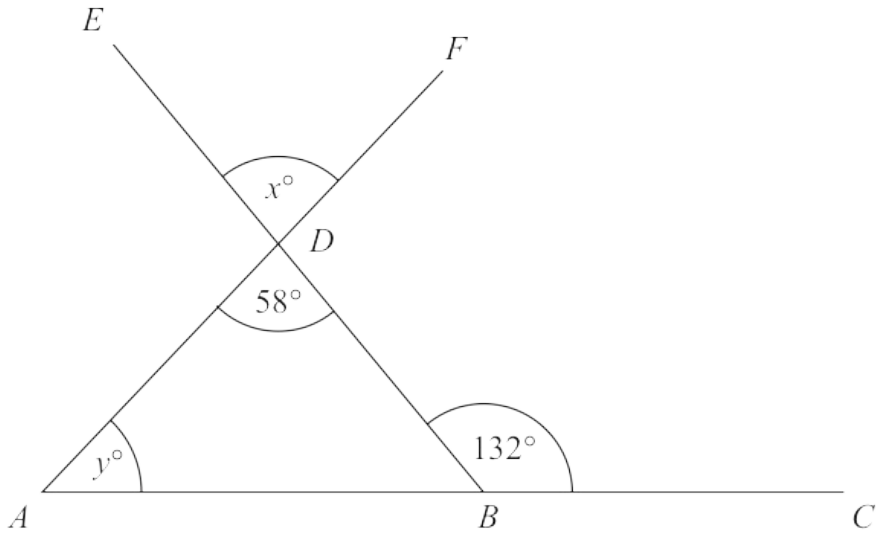


Diagram **NOT** accurately drawn

ABC, BDE and ADF are straight lines.

angle $CBD = 132°$ angle $ADB = 58°$

(a) (i) Write down the value of x

$x =$ .....

(ii) Give a reason for your answer.

.....

(2)

(b) Work out the value of y

$y =$ .....

(2)

26 The diagram shows a regular 10-sided polygon, *ABCDEFGHIJ*

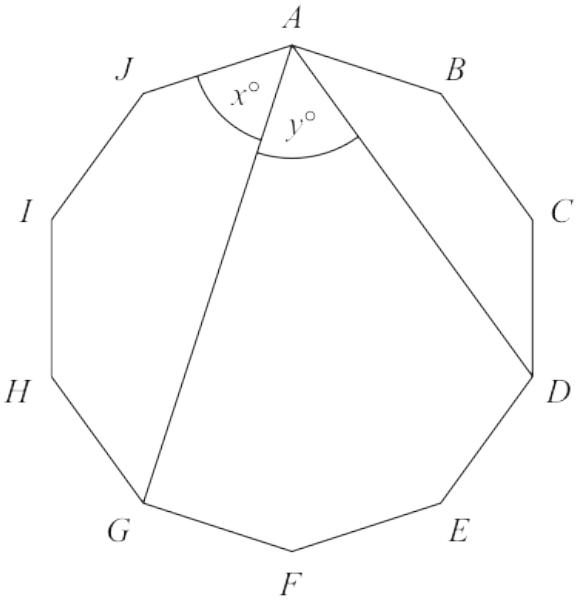


Diagram **NOT** accurately drawn

Show that $x = y$

(Total for Question 26 is 4 marks)

8 ABC is a straight line and BCD is a triangle.

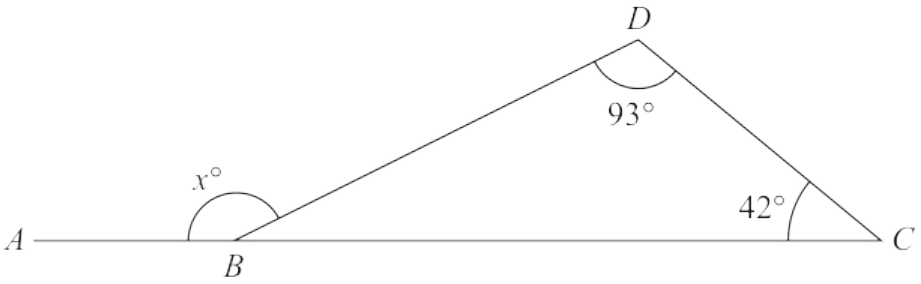


Diagram **NOT** accurately drawn

(a) Work out the value of x

$x =$ .....

(2)

PO, RO, SO and TO are four straight lines.

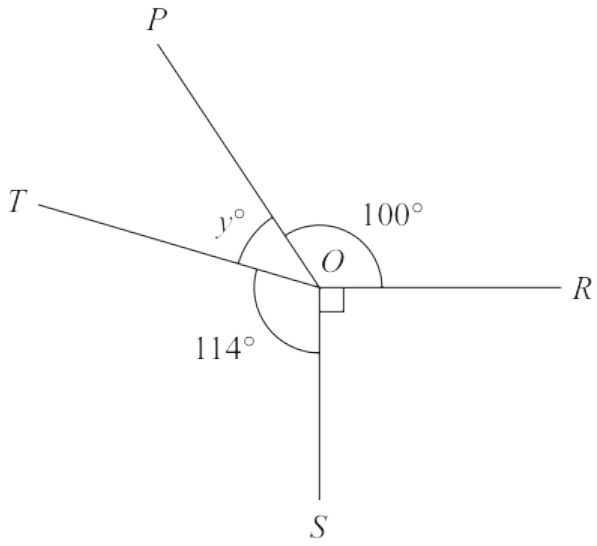


Diagram **NOT** accurately drawn

(b) (i) Work out the value of y

$y =$ .....

(2)

(ii) Give a reason for your answer.

.....

(1)

9 Here is a quadrilateral.

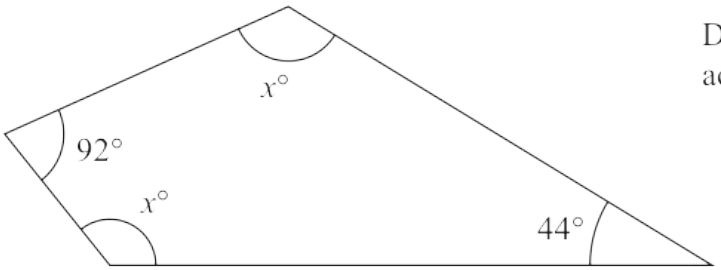


Diagram **NOT** accurately drawn

(i) Work out the value of x

$x =$ .....

(3)

(ii) Give a reason for your answer.

.....

(1)

21 The diagram shows a regular octagon $ABCDEFGH$ and a regular pentagon $ABIJK$

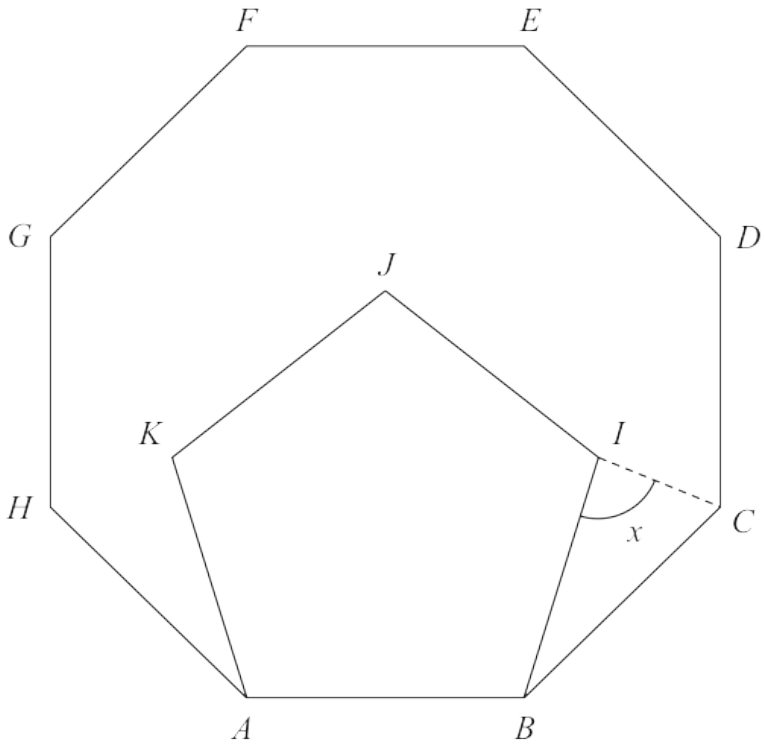


Diagram **NOT** accurately drawn

Work out the size of the angle x

.....°

(Total for Question 21 is 4 marks)

6

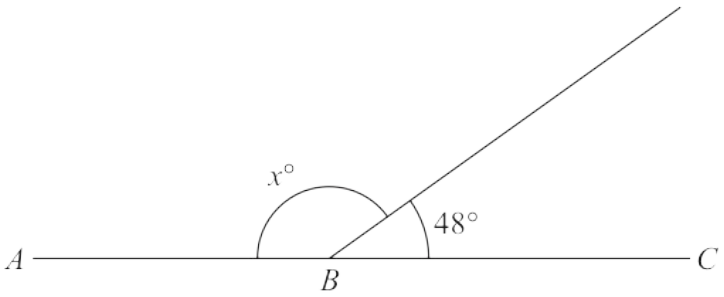


Diagram **NOT** accurately drawn

ABC is a straight line.

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

$x =$ .....

(1)

(ii) Give a reason for your answer to (i)

.....

(1)

Question 6 continued

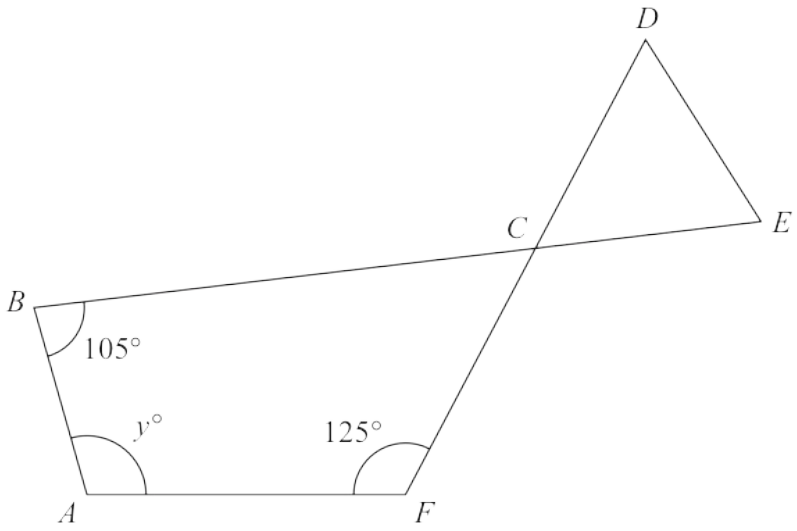


Diagram **NOT** accurately drawn

CDE is an equilateral triangle.
ABCF is a quadrilateral.

BCE and *DCF* are straight lines.

(b) Work out the value of y
You must show your working.

$y =$ .....

(3)

19 The diagram shows parts of three regular polygons, **A**, **B** and **C**, meeting at a point.

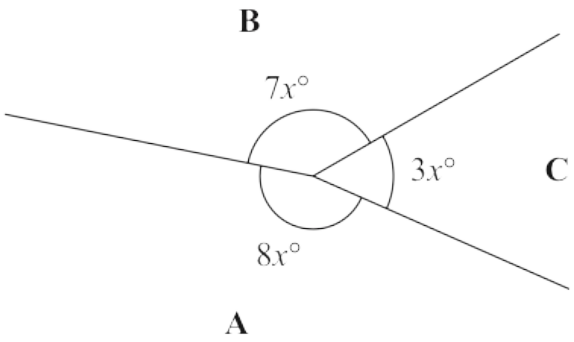


Diagram **NOT** accurately drawn

Polygon **B** has n sides.

Work out the value of n.

$n =$ .....

(Total for Question 19 is 4 marks)

10

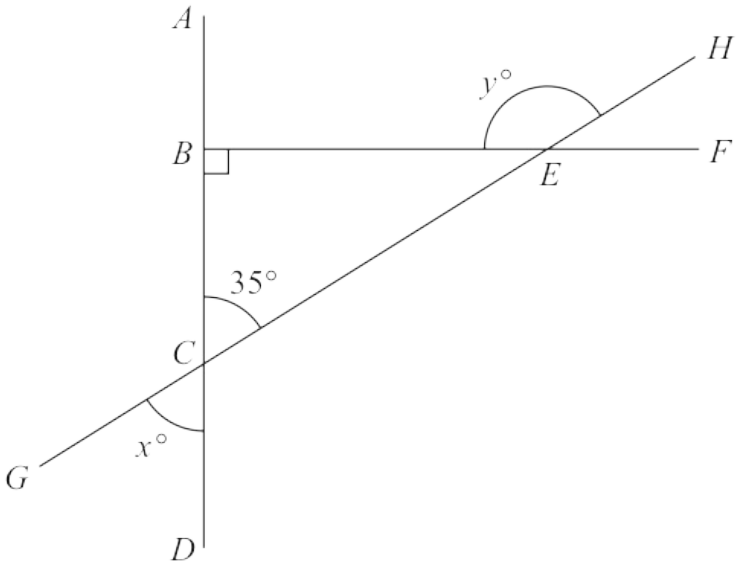


Diagram **NOT** accurately drawn

In the diagram, BCE is a right-angled triangle.
$ABCD$, BEF and $GCEH$ are straight lines.

Angle $BCE = 35°$

(a) (i) Find the value of x

$x =$ .....

(1)

(ii) Give a reason for your answer.

.....

(1)

(b) (i) Work out the value of y

$y =$ .....

(2)

(ii) Give a reason for your answer.

.....

.....

(1)

12 The diagram below shows the trapezium $PQRS$

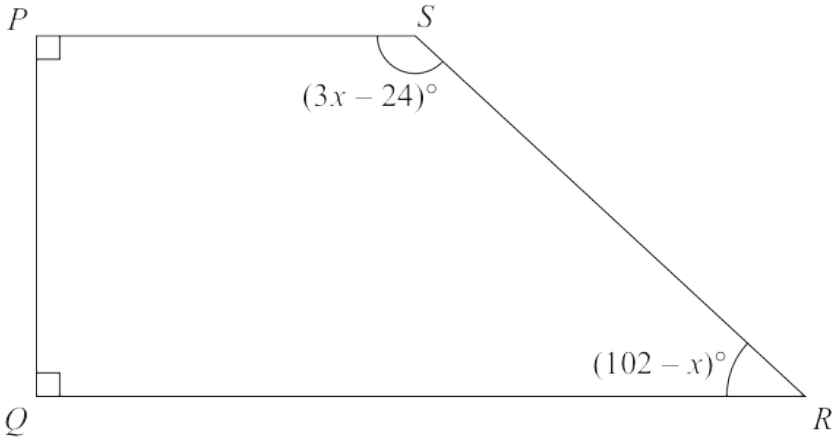


Diagram **NOT** accurately drawn

Angle PQR and angle QPS are right angles.

Find the value of x

$x =$ .....

(Total for Question 12 is 3 marks)

27 The diagram shows triangle ABP inside the regular hexagon $ABCDEF$

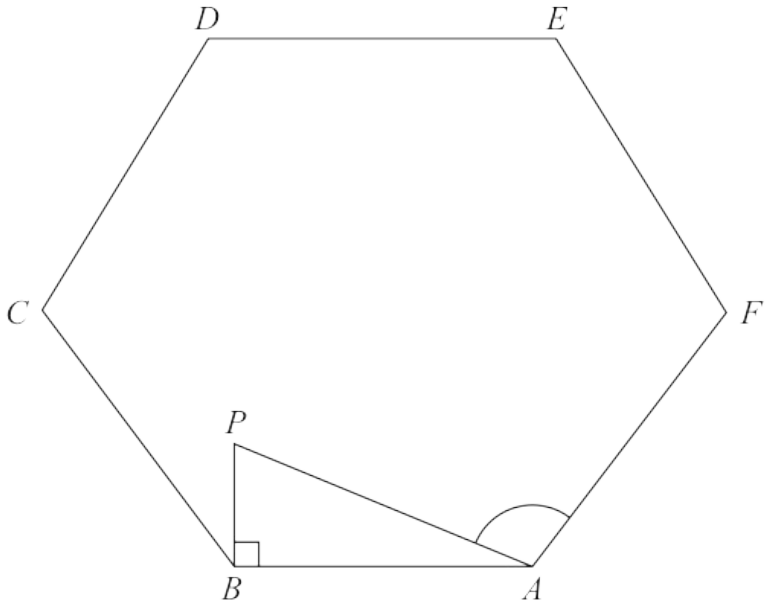


Diagram **NOT** accurately drawn

$AB = 5\,\text{cm}$ $BP = 2\,\text{cm}$ Angle $ABP = 90°$

Work out the size of angle PAF
Give your answer correct to 3 significant figures.

.....°

(Total for Question 27 is 5 marks)

19 The diagram shows a pentagon.

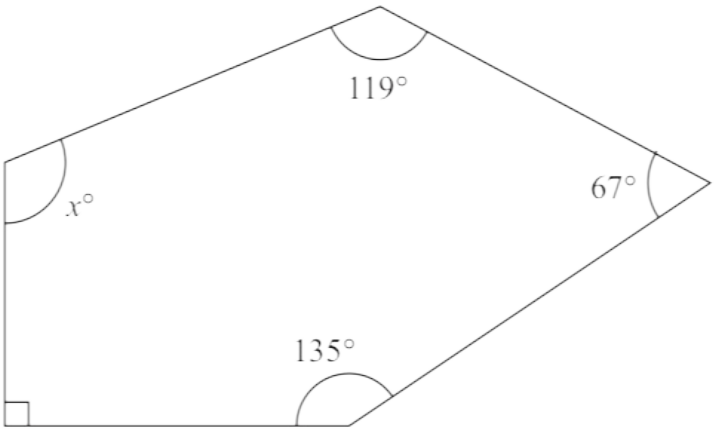


Diagram **NOT** accurately drawn

Work out the value of x

$x =$ .....

(Total for Question 19 is 3 marks)

15 The diagram shows two parallel lines AB and DEF

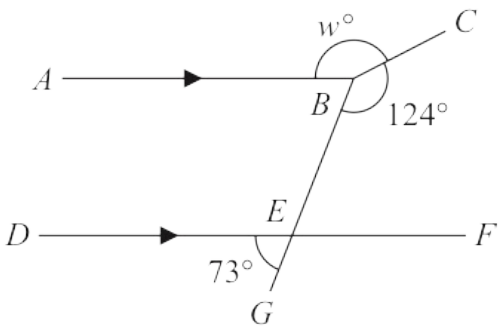


Diagram **NOT** accurately drawn

BEG is a straight line.

angle $DEG = 73°$ angle $EBC = 124°$ angle $ABC = w°$

Work out the value of w
Give reasons for each stage of your working.

$w =$ .....

(Total for Question 15 is 4 marks)

9

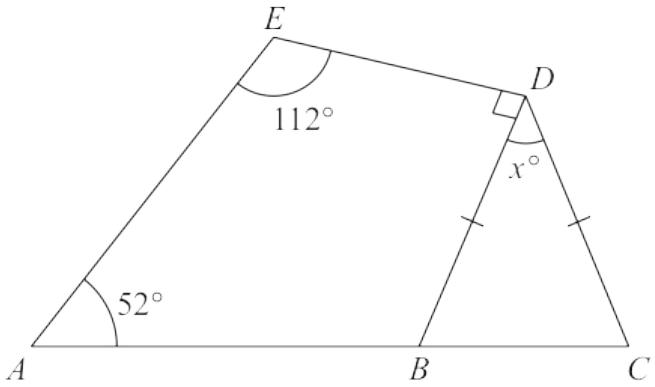


Diagram **NOT** accurately drawn

BCD is an isosceles triangle with $BD = CD$
ABC is a straight line.
ABDE is a quadrilateral.

Work out the value of x
Give a reason for each stage of your working.

$x =$ .....

(Total for Question 9 is 4 marks)

25

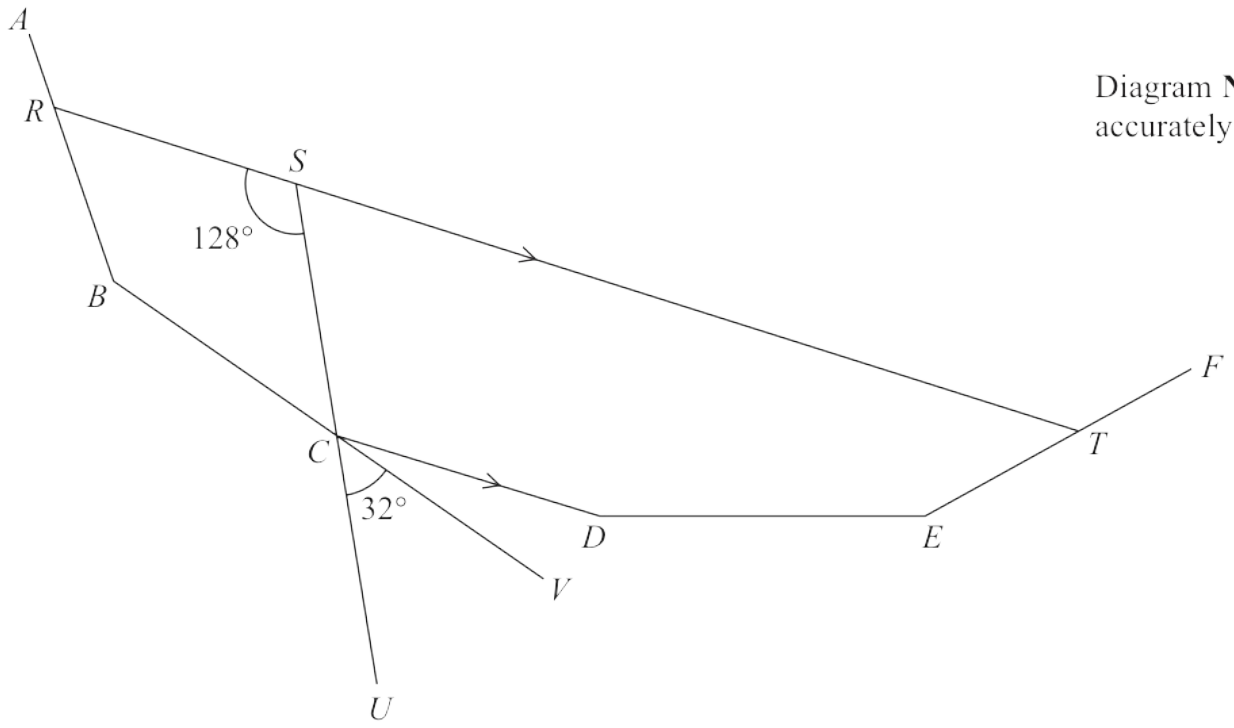


Diagram **NOT** accurately drawn

AB, *BC*, *CD*, *DE* and *EF* are five sides of a regular polygon.

RST, *SCU* and *BCV* are straight lines.
RST is parallel to *CD*
Angle *RSC* = 128°
Angle *UCV* = 32°

Work out how many sides the polygon has.
Show your working clearly.

(Total for Question 25 is 4 marks)

19 $ABCD$ is a trapezium.

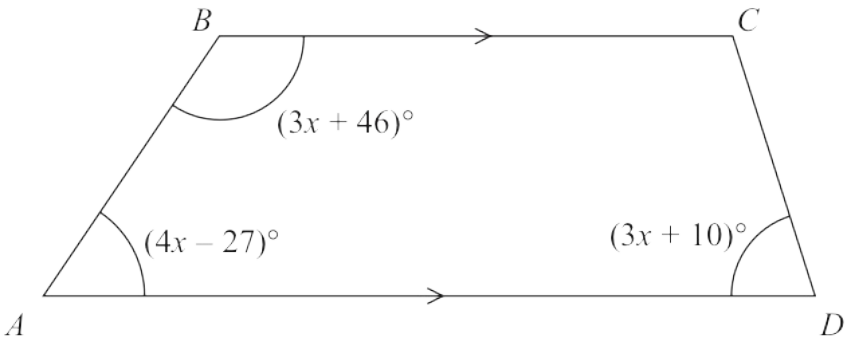


Diagram **NOT** accurately drawn

BC is parallel to AD

Find the size of the largest angle inside the trapezium.

.....°

(Total for Question 19 is 4 marks)

23

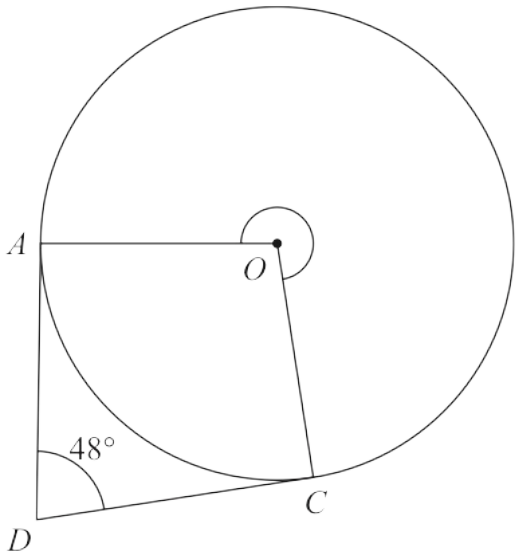


Diagram **NOT** accurately drawn

A and C are points on a circle, centre O
DA is the tangent to the circle at A and DC is the tangent to the circle at C

Angle $ADC = 48°$

Work out the size of reflex angle AOC

.....°

(Total for Question 23 is 3 marks)

27 Here is a 9-sided regular polygon $ABCDEFGHJ$, with centre O

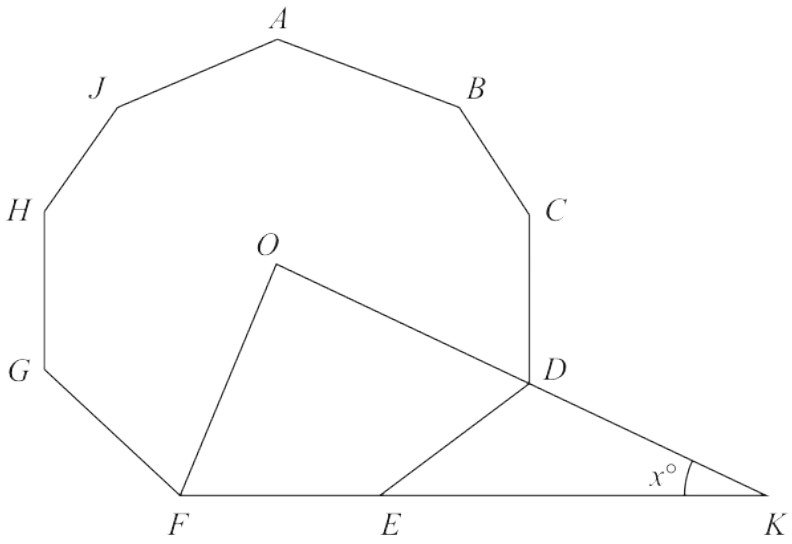


Diagram **NOT** accurately drawn

ODK and FEK are straight lines.

Work out the value of x

$x =$ .....

(Total for Question 27 is 3 marks)

9 The diagram shows quadrilateral $ABCD$

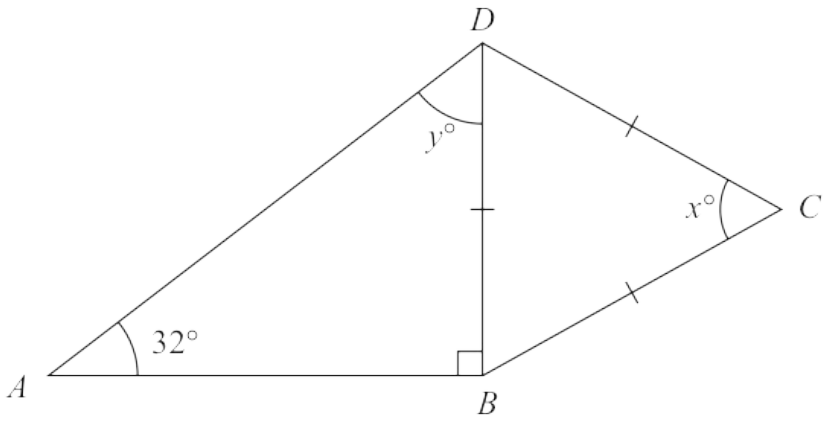


Diagram **NOT** accurately drawn

$BC = CD = DB$
angle $DBA = 90°$ and angle $DAB = 32°$

(a) Work out the value of x

$x =$ .....

(1)

(b) (i) Work out the value of y

$y =$ .....

(1)

(ii) Give a reason for your answer to (b)(i).

.....

.....

(1)

9 The diagram shows two triangles ABE and ECD

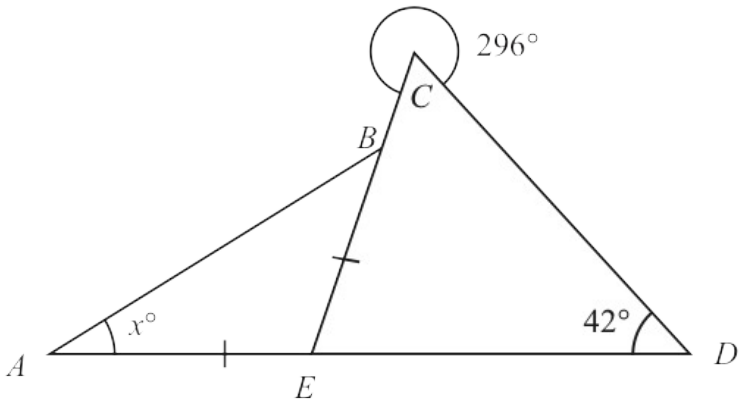


Diagram **NOT** accurately drawn

Triangle ABE is isosceles with $AE = EB$
AED and EBC are straight lines.

Angle $CDE = 42°$
The reflex angle $ECD = 296°$
Angle $BAE = x°$

Work out the value of x

$x =$ .....

(Total for Question 9 is 4 marks)

8

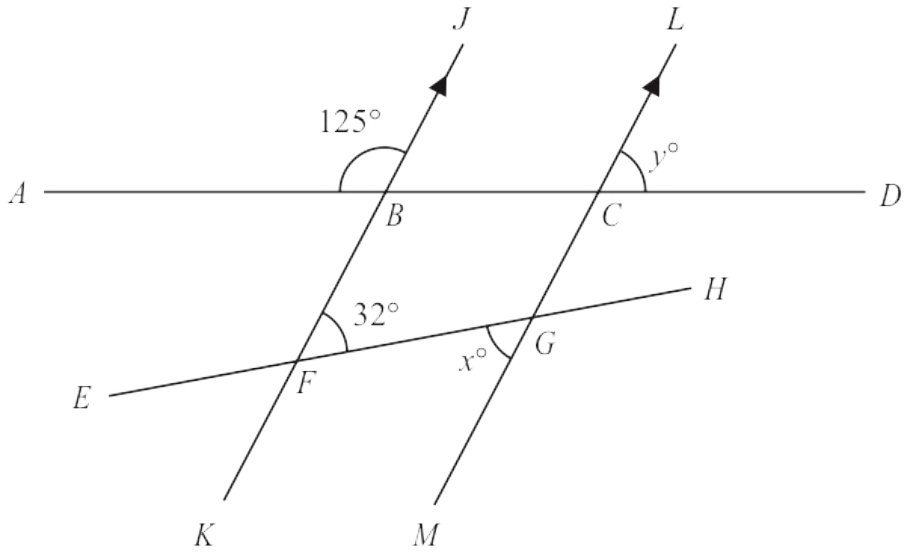


Diagram **NOT** accurately drawn

ABCD and *EFGH* are straight lines.
KFBJ and *MGCL* are parallel straight lines.

angle $ABJ = 125°$ angle $BFG = 32°$ angle $FGM = x°$ angle $LCD = y°$

(a) Write down the value of x

$x =$ .....

(1)

(b) (i) Work out the value of y

$y =$ .....

(2)

(ii) Give a reason for your answer to (b) (i)

.....

(1)