EXAM PAPERS PRACTICE

GCSE OCR Math J560

Angles in polygon

Answers

"We will help you to achieve A Star "

Answer 1

The diagram shows a pattern using four identical rhombuses.

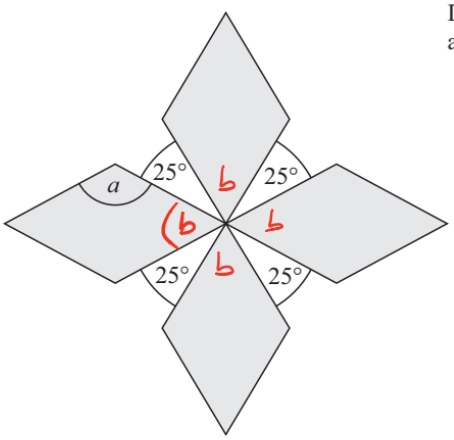
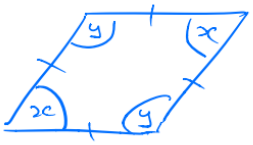


Diagram **NOT** accurately drawn

RHOMBUS
(SPECIAL PARALLELOGRAM)



$x + y = 180$

Work out the size of the angle marked *a*.
You must show your working.

$4b + 4 \times 25 = 360$

$-100 \qquad -100$

$\frac{4b}{4} = \frac{260}{4}$

$b = 65°$

$a + b = 180$

$-b \qquad -b$

$a = 180 - b$

$= 180 - 65$

$= 115°$

Answer 2

ABCDE and *PQRST* are regular pentagons.

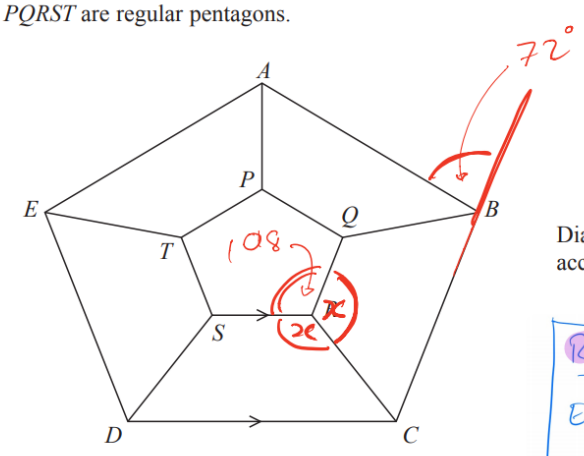


Diagram **NOT** accurately drawn

SR is parallel to *DC*
AP = *BQ* = *CR* = *DS* = *ET*

Work out the size of angle *SRC*.
You must show all your working.

REGULAR POLYGONS (n SIDES)

EXTERIOR ANGLE = $\frac{360}{n}$

INTERIOR ANGLE
= 180 − EXTERIOR ANGLE

EXT ANGLE = $\frac{360}{5}$ = 72°

INT ANGLE = $180^\circ - 72^\circ$ = 108°

$x + x + 108 = 360$

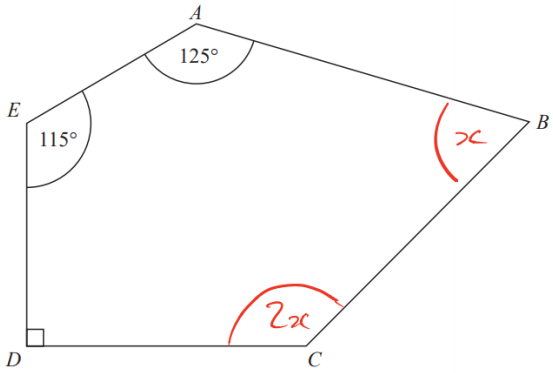
$-108 \quad -108$

$\frac{2x}{2} = \frac{252}{2}$

$x = 126^\circ$

Answer 3

ABCDE is a pentagon.



Angle *BCD* = 2 × angle *ABC*

Work out the size of angle *BCD*. = 2x
You must show all your working.

POLYGONS (n SIDES)

TOTAL INTERNAL ANGLE = $(n-2)\times 180$

TOTAL INT ANGLE = $(5-2)\times 180$

$= 540°$

So

$90 + 115 + 125 + x + 2x = 540$

$330 + 3x = 540$

$-330 \quad -330$

$\frac{3x}{3} = \frac{210}{3}$

$x = 70$

So $B\hat{C}D = 2 \times 70 = 140°$

Answer 4

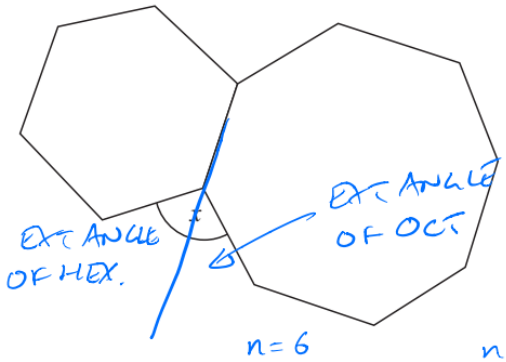
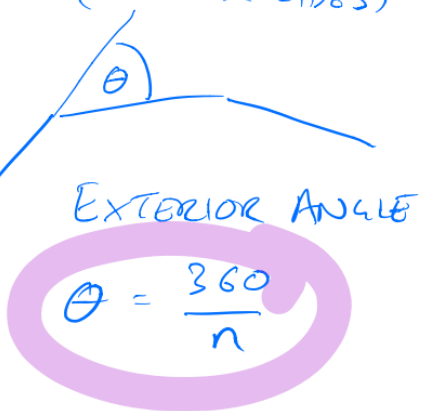


Diagram **NOT** accurately drawn

The diagram shows a regular hexagon and a regular octagon.

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

REGULAR POLYGON (WITH n SIDES)



HEX.

EXT ANGLE $= \frac{360}{6}$

$= \frac{^{6}\cancel{36} \times 10}{\cancel{6}_{1}}$

$= 60°$

OCT

EXT ANGLE $= \frac{360}{8}$

$= 45°$

$x = 60 + 45$

$= 105°$

÷ 8 IS HALVING 3 TIMES.

360 $\xrightarrow{\times\frac{1}{2}}$ 180 $\xrightarrow{\times\frac{1}{2}}$ 90 $\xrightarrow{\times\frac{1}{2}}$ 45

Answer 5

$\frac{360}{2} = 180$

$\frac{180}{2} = 90$

$\frac{90}{2} = 45$

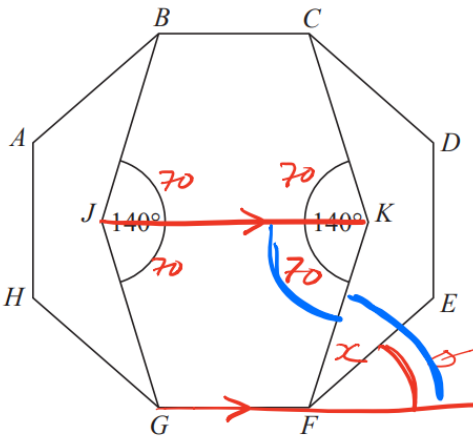


Diagram **NOT** accurately drawn

$\frac{360}{8} = 45$

ABCDEFGH is a regular octagon.
BCKFGJ is a hexagon.

JK is a line of symmetry of the hexagon.
Angle *BJG* = angle *CKF* = 140°

Work out the size of angle *KFE*.
You must show all your working.

$\hat{JKE} = \hat{KFP}$ (ALTERNATE ANGLES)

$\hat{KFP} = 70°$

$x = \hat{KFP} - \hat{EFP}$

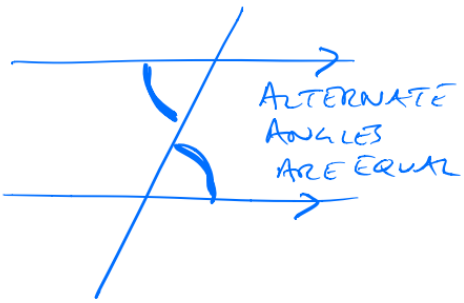
$x = 70 - 45$

$= 25°$

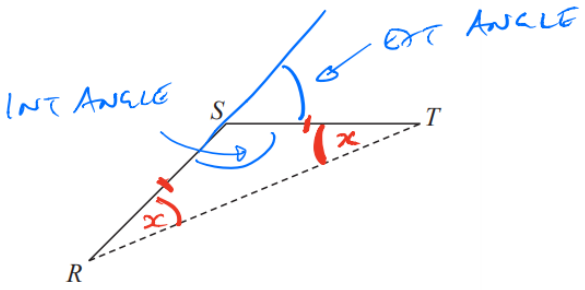
REGULAR POLYGONS (n SIDES)

EXTERIOR ANGLE $= \frac{360}{n}$

INTERIOR ANGLE
= 180 − EXTERIOR ANGLE



Answer 6



RS and *ST* are 2 sides of a regular 12-sided polygon.
RT is a diagonal of the polygon.

Work out the size of angle *STR*.
You must show your working.

REGULAR POLYGONS (n SIDES)

EXTERIOR ANGLE = $\frac{360}{n}$

INTERIOR ANGLE
= 180 − EXTERIOR ANGLE

$\triangle RST$ IS ISOSCELES

EXT ANGLE = $\frac{360}{12}$ = 30°

INT ANGLE ($R\hat{S}T$) = 180 − 30

= 150°

$\triangle RST$: $150 + 2x = 180$

$-150 \quad -150$

$\frac{2x}{2} = \frac{30}{2}$

$x = 15°$ = $S\hat{T}R$

Answer 7

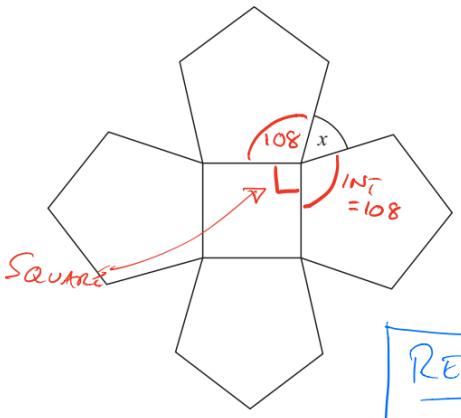


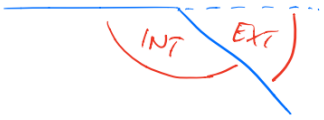
Diagram **NOT** accurately drawn

The diagram shows a square and 4 regular pentagons.

Work out the size of the angle marked x.

REGULAR POLYGONS (n SIDES)

EXTERIOR ANGLE $= \frac{360}{n}$



INTERIOR ANGLE
= 180 − EXTERIOR ANGLE

PENTAGON:

EXT ANGLE $= \frac{360}{5}$

$= 36 \times 2$

$= 72$

INT ANGLE $= 180 - 72$

$= \underline{108}$

So $x = 360 - 108 - 108 - 90$ (360° IN CIRCLE)

$= 360 - (108 + 108 + 90)$

$= 360 - 306$

$= \underline{54°}$

Answer 8

360 ÷ 2 = 180
180 ÷ 2 = 90
90 ÷ 2 = 45
so
360 ÷ 8 = 45

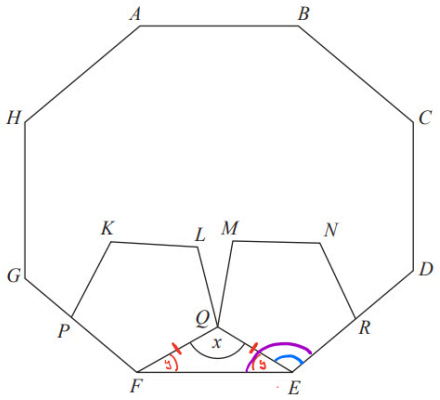


Diagram **NOT** accurately drawn

$\frac{360}{5} = \frac{360}{10} \times 2$

$= 36 \times 2$

$= 72$

ABCDEFGH is a regular octagon.
KLQFP and *MNREQ* are two identical regular pentagons.

Work out the size of the angle marked *x*.
You must show all your working.

REGULAR POLYGONS (n SIDES)
EXTERIOR ANGLE = $\frac{360}{n}$

INTERIOR ANGLE
= 180 − EXTERIOR ANGLE

OCTAGON: EXT ANGLE = $\frac{360}{8}$

$= 45$

INT. ANGLE = $180 - 45$

$= 135°$

PENTAGON: EXT ANGLE = $\frac{360}{5}$

$= 72$

INT ANGLE = $180 - 72$

$= 108°$

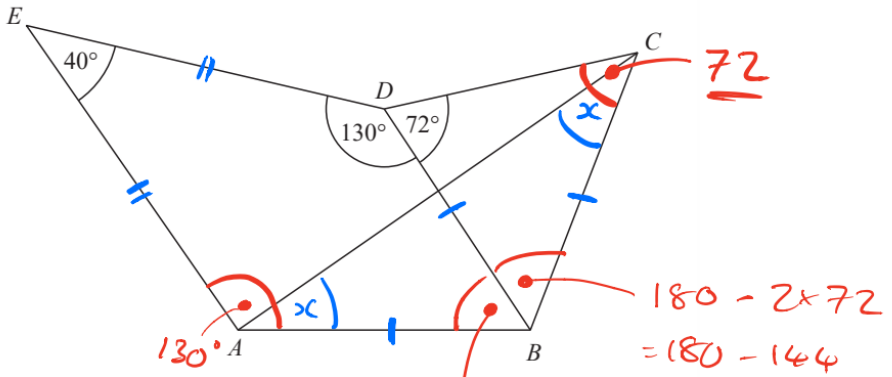
$y = 135 - 108 = 27°$

(ISOS Δ) $x = 180 - 2 \times 27 = 180 - 54 = 126°$

Answer 9

Here is a pentagon *ABCDE*.

Diagram **NOT** accurately drawn



72

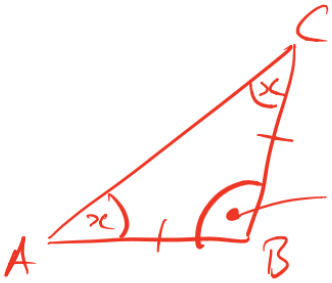
180 − 2×72
= 180 − 144
= 36

360 − 130 − 130 − 40
= 360 − 260 − 40
= 360 − 300
= 60°

AB = *BC* = *BD*
ABDE is a kite.

Angle *AED* = 40°
Angle *EDB* = 130°
Angle *BDC* = 72°

Work out the size of angle *ACB*.



60 + 36
= 96°

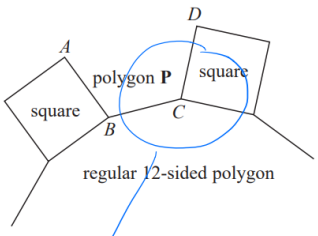
$2x + 96 = 180°$
$-96 \quad -96$

$\frac{2x}{2} = \frac{84}{2}$

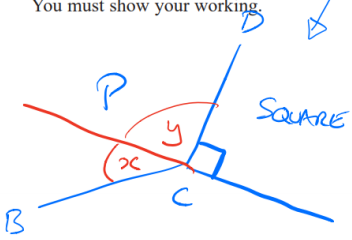
$A\hat{C}B = x = 42°$

Answer 10

In the diagram, AB, BC and CD are three sides of a regular polygon **P**.



Show that polygon **P** is a hexagon.
You must show your working.



x+y IS INTERIOR ANGLE OF P

REGULAR POLYGONS (n SIDES)
EXTERIOR ANGLE = $\frac{360}{n}$
INT EXT
INTERIOR ANGLE = 180 − EXTERIOR ANGLE

12-GON

x (EXT. ANGLE OF 12-GON) = $\frac{360}{12}$ = 30°

y (EXT. ANGLE OF SQUARE) = 90°

INT ANGLE OF P = x+y = 30+90 = 120°

SO EXT ANGLE OF P = 180 − 120 = 60°

$n \times \frac{360}{n} = 60 \times n$

$\frac{360}{60} = \frac{60n}{60}$

$n = \frac{360}{60}$ = 6 SIDES

SO P IS A HEXAGON

Answer 11

The diagram shows part of a pattern made from tiles.

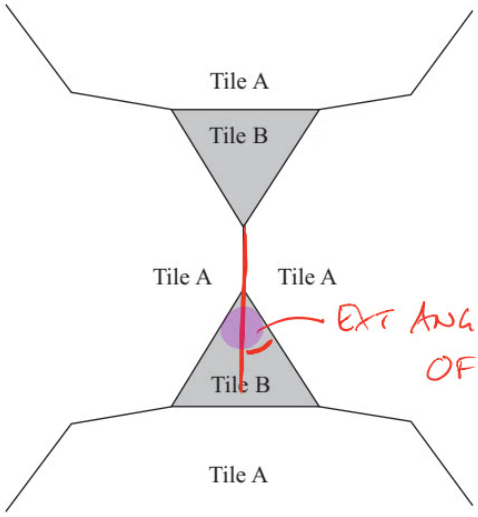


Diagram **NOT** accurately drawn

EXT ANGLE OF TILE A.

The pattern is made from two types of tiles, tile A and tile B.

Both tile A and tile B are regular polygons.

Work out the number of sides tile A has.

n

SINCE TILE B IS EQUILATERAL (AND BY SYMMETRY)

EXT ANGLE OF A $= \frac{1}{2} \times 60$

$n \times \frac{360}{n} = 30 \times n$

$\frac{360}{30} = \frac{30n}{30}$

$n = \frac{360}{30} = 12$ SIDES

REGULAR POLYGONS

EXTERIOR ANGLE $= \frac{360}{n}$

INTERIOR ANGLE $= 180 - \frac{360}{n}$

OR

INTERIOR ANGLE $= 180\left(\frac{n-2}{n}\right)$

Answer 12

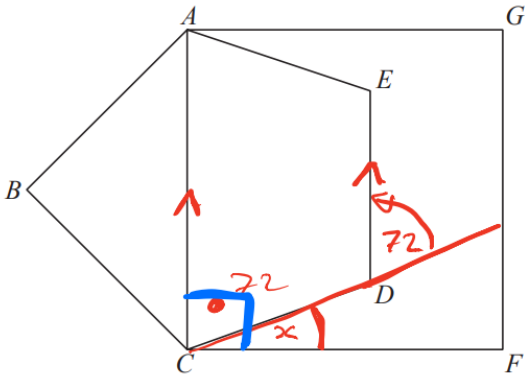


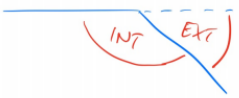
Diagram **NOT** accurately drawn

ABCDE is a regular pentagon.
ACFG is a square.

Work out the size of angle *DCF*.
You must show all your working.

REGULAR POLYGONS (n SIDES)

EXTERIOR ANGLE = $\frac{360}{n}$



INTERIOR ANGLE
= 180 − EXTERIOR ANGLE

EXT ANGLE OF PENTAGON = $\frac{360}{5}$

(÷10, ×2) $= 36 \times 2$

$= 72$

AC ∥ DE So $A\hat{C}D = 72$

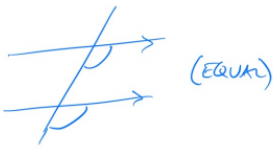
(CORRESPONDING ANGLES)

$x = 90 - 72$

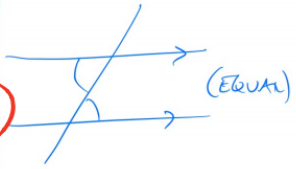
$= 18°$

ANGLES IN PARALLEL LINES

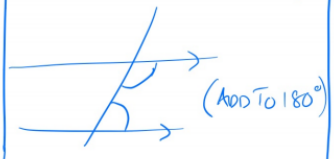
CORRESPONDING:



ALTERNATE:



CO-INTERIOR / ALLIED



Answer 13

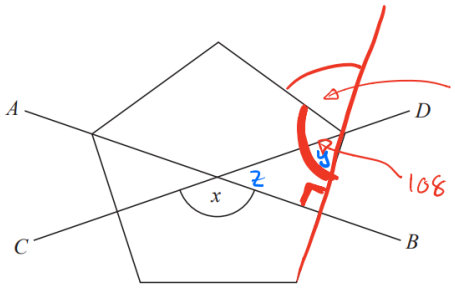


Diagram **NOT** accurately drawn

The diagram shows a regular pentagon.
AB and *CD* are two of the lines of symmetry of the pentagon.

Work out the size of the angle marked *x*.
You must show all your working.

REGULAR POLYGONS (n SIDES)

EXTERIOR ANGLE = $\frac{360}{n}$

INTERIOR ANGLE
= 180 − EXTERIOR ANGLE

EXT ANGLE = $\frac{360}{5}$ = 72°

INT ANGLE = 180 − 72
= 108°

$y = \frac{1}{2} \times 108 = 54°$ (BY SYMMETRY)

$z = 90 - 54 = 36°$

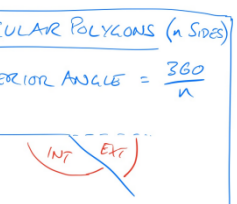
$x = 180 - z$
$= 180 - 36$
$= 144°$

Answer 14

ABCDEFGHI is a regular 9-sided polygon.

REGULAR POLYGONS (n SIDES)

EXTERIOR ANGLE = $\frac{360}{n}$



INTERIOR ANGLE
= 180 − EXTERIOR ANGLE

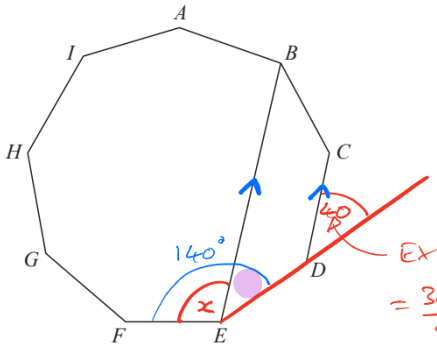


Diagram **NOT** accurately drawn

EXT ANGLE
= $\frac{360}{9}$

The vertices *B* and *E* are joined with a straight line.

Work out the size of angle *BEF*.
You must show how you get your answer.

EXT ANGLE = $\frac{360}{9}$ = 40°

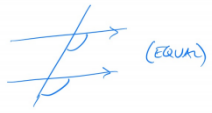
INT ANGLE = 180 − 40
= 140°

$B\hat{E}D$ = 40° (CORRESPONDING ANGLES)

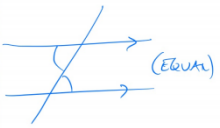
$x (= B\hat{E}F)$ = 140 − 40
= 100°

ANGLES IN PARALLEL LINES

CORRESPONDING:



ALTERNATE:



CO-INTERIOR / ALLIED