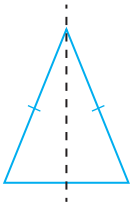
Fully-Worked Solutions

CHAPTER 4 Polygons

UPSKILL 4.1

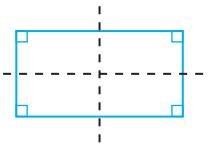
1 (a) Regular polygon
(b) Regular polygon
(c) Irregular polygon
(d) Irregular polygon
(e) Irregular polygon
(f) Regular polygon

2 (a)



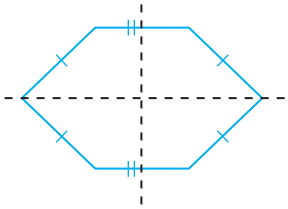
One axis of symmetry

(b)



Two axes of symmetry

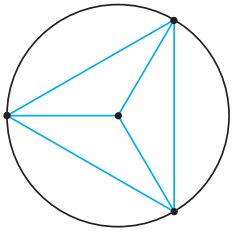
(c)

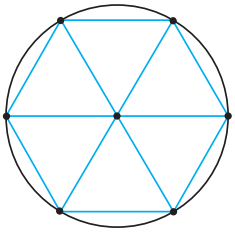


Two axes of symmetry

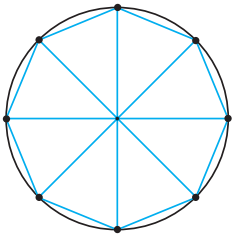
3 (a) 4 (b) 7 (c) 5 (d) 10

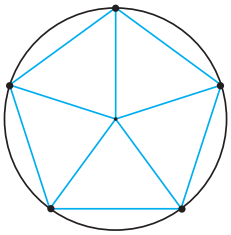
4 (a) Equilateral triangle (b) Regular hexagon



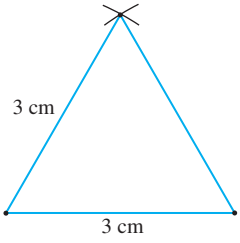


(c) Regular octagon (d) Regular pentagon

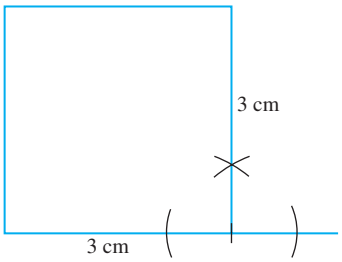




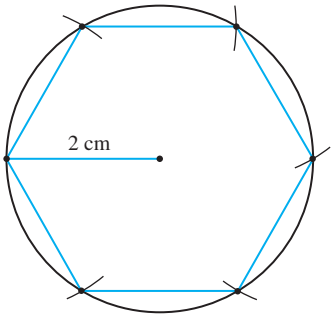
5 (a)



(b)



(c)



UPSKILL 4.2

1 Interior angle: d, f, h and k
Exterior angle: e, g and j

2 (a) $p = 180° - 142° = 38°$
$q = 180° - 98° = 82°$

(b) $x = 180° - 130° = 50°$
$y = 180° - 65° = 115°$

3 (a) $(3 - 2) \times 180° = 180°$

(b) $(4 - 2) \times 180° = 360°$

(c) $(7 - 2) \times 180° = 900°$

(d) $(9 - 2) \times 180° = 1\,260°$

4 $(n - 2) \times 180° = 1\,800°$
$n - 2 = 10$
$n = 12$

5 (a) $k + 90° + 112° + 93° = 360°$
$k + 295° = 360°$
$k = 65°$

(b) $k + 118° + 66° + 100° + 98° = (5 - 2) \times 180°$
$k + 382° = 540°$
$k = 158°$

(c) $8k = (8 - 2) \times 180°$
$8k = 1\,080°$
$k = 135°$

6 (a) $m + 120° + 140° = 360°$
$m + 260° = 360°$
$m = 100°$

(b) $m + 115° + 90° + 90° = 360°$
$m + 295° = 360°$
$m = 65°$

(c) $m + 20° + 20° + 50° + 50° + 90° = 360°$
$m + 230° = 360°$
$m = 130°$

7 (a) Interior angle of regular pentagon $= \dfrac{(5 - 2) \times 180°}{5} = 108°$

(b) Interior angle of regular decagon $= \frac{(10-2)\times 180°}{10} = 144°$

(c) Interior angle of regular polygon with 12 sides
$= \frac{(12-2)\times 180°}{12} = 150°$

8 (a) Exterior angle of regular hexagon $= \frac{360°}{6} = 60°$

(b) Exterior angle of regular nonagon $= \frac{360°}{9} = 40°$

(c) Exterior angle of regular polygon with 15 sides
$= \frac{360°}{15} = 24°$

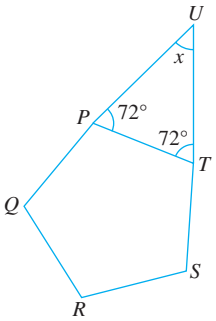
9 (a) Interior angle = 140°, exterior angle = 180° − 140° = 40°
$n = \frac{360°}{40°} = 9$

(b) Interior angle = 160°, exterior angle = 180° − 160° = 20°
$n = \frac{360°}{20°} = 18$

(c) Exterior angle = 15°
$n = \frac{360°}{15°} = 24$

10 Let exterior angle = p
Interior angle = 3 × Exterior angle
$= 3p$
Interior angle + Exterior angle = 180°
$3p + p = 180°$
$4p = 180°$
$p = 45°$
∴ Number of sides of the regular polygon, $n = \frac{360°}{45°} = 8$

11 Exterior angle of regular pentagon
$= \frac{360°}{5}$
$= 72°$
$x + 72° + 72° = 180°$
$x + 144° = 180°$
$x = 36°$



12 Angle at the centre of a regular hexagon
$= \frac{360°}{6}$
$= 60°$
$x = 2 \times 60° = 120°$

Summative Practice 4

Section A

1 *Answer*: **B**

2 Number of axes of symmetry for regular nonagon
= Number of sides
= 9
Answer: **C**

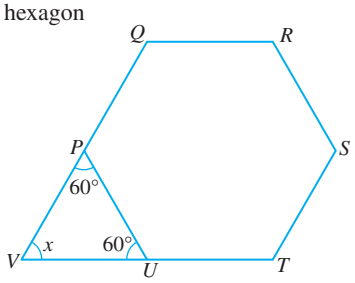
3 *Answer*: **D**

4 Number of triangles formed in 15 sided polygon = 15 − 2 = 13
Answer: **B**

5 Sum of the interior angles of a heptagon = (7 − 2) × 180°
= 900°
Answer: **D**

6 Sum of the exterior angles of a polygon is 360°.
Answer: **A**

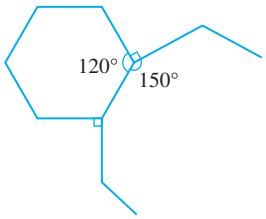
7 Exterior angle of a regular hexagon
$= \frac{360°}{6}$
$= 60°$
$x = 180° - 60° - 60°$
$= 60°$
Answer: **D**



8 Sum of interior angles of pentagon = 540°
$\angle UQR = \angle QUT = \angle UTS = \frac{540° - 90° - 90°}{3} = 120°$
$x = 180° - 120° = 60°$
Answer: **A**

9 Exterior angle of the regular polygon = 180° − 160°
= 20°
Number of sides of the polygon $= \frac{360°}{20°} = 18$
Answer: **D**

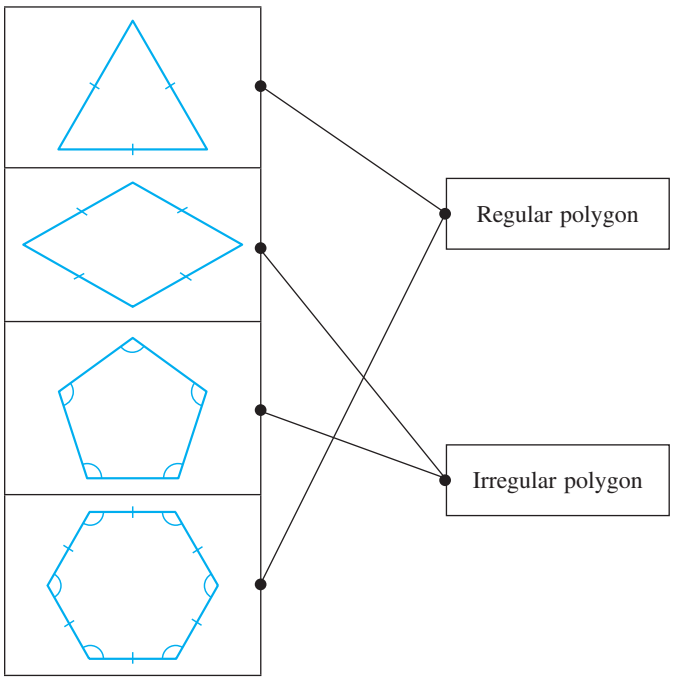
10



Interior angle of regular hexagon = 120°
Interior angle of the incomplete regular polygon
= 360° − 120° − 90° = 150°
Exterior angle of the incomplete regular polygon
= 180° − 150° = 30°
Number of sides $= \frac{360°}{30°} = 12$
Answer: **C**

Section B

1



2 (a) 1 (b) 5 (c) 2 (d) 7

3

	Statements	TRUE or FALSE
(a)	The number of axes of symmetry for a polygon is equals to the number of sides of the polygon.	FALSE
(b)	The sum of exterior angles of a pentagon is 360°.	TRUE
(c)	The interior angle of a regular hexagon is 120°.	TRUE
(d)	Rhombus is a regular polygon.	FALSE

4 (a) $a + b + c + d + e + f = (6 - 2) \times 180°$
$= 720°$

(b) $p + q + r + s + t = 360°$

Section C

1 (a) p = exterior angle of regular octagon
$= \frac{360°}{8}$
$= 45°$

(b) (i) Regular hexagon and regular octagon

(ii) Interior angle of a regular hexagon
= 180° − Exterior angle
$= 180° - \frac{360°}{6}$
$= 120°$

$\angle QPS = \frac{1}{2} \times 120° = 60°$

Interior angle of a regular octagon
= 180° − Exterior angle
$= 180° - \frac{360°}{8}$
$= 135°$

$\angle APS = \frac{1}{2} \times 135° = 67.5°$

$y = \angle QPS + \angle APS$
$= 60° + 67.5°$
$= 127.5°$

(c) Interior angle of a regular hexagon = 180° − Exterior angle
$= 180° - \frac{360°}{6}$
$= 120°$

Interior angle of a regular pentagon = 180° − Exterior angle
$= 180° - \frac{360°}{5}$
$= 108°$

$\angle EFR = 120° - 108° = 12°$

$\angle RFC = \angle EFC - \angle EFR$
$= 60° - 12°$
$= 48°$

$\angle QRP = \frac{180° - 108°}{2} = 36°$

$\angle FRP = 108° - 36° = 72°$

$\therefore x = \angle RFC + \angle FRP$
$= 48° + 72°$
$= 120°$

2 (a) $x = 180° - 160° = 20°$
$y = 180° - 34° = 146°$

(b) Interior angle of a regular pentagon = 180° − Exterior angle
$= 180° - \frac{360°}{5}$
$= 108°$

For quadrilateral $ABDE$,
$108° + 108° + 90° + p = 360°$
$p + 306° = 360°$
$p = 54°$

(c) (i) Let the exterior angle be x, hence the interior angle is $3x$.

Interior angle + Exterior angle = 180°
$3x + x = 180°$
$4x = 180°$
$x = 45°$

Number of sides of regular polygon $= \frac{360°}{45°} = 8$

$\therefore$ The shape of the pool is regular octagon

(ii) Cost = $8 \times 5 \times 12$
= RM480