Solutions

Page 278 #s 2 – 6, 10, 13ace, 14bc, 17bd

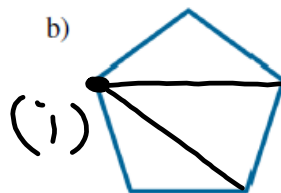**2.** For each of the following polygons,

    i) copy the figure on a separate page and draw line segments from one vertex to the other vertices.

    ii) state the number of triangles created as a result of part (i).

    iii) use your answer from part (ii) to determine the sum of the polygon's interior angles.

a)

(i)

b)

(i)

(ii) 2 triangles

(ii) 3 triangles

(iii) Sum of interior angles = 2×180 = 360°
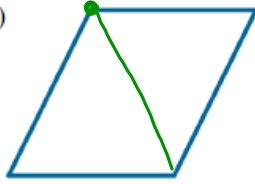
(iii) Sum of interior angles = 3×180 = 540°

3. State the sum of the interior angles for each polygon.
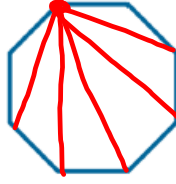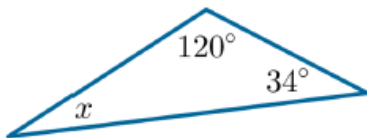
a)   b)   c)   d)
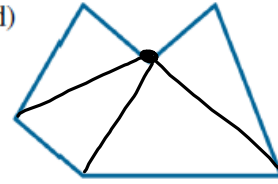
a) $180°$

b) 2×180
   $= 360°$

c) 6×180
   $= 1080°$

d) 4×180
   $= 720°$

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4. Determine the value of angle x in each polygon.

a)   b)   c)

a) Sum $= 180°$

$x + 120 + 34 = 180$

$x + 154 = 180$

$x + 154 - 154$
$\quad = 180 - 154$

$x = 26°$
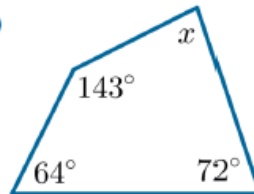
b) Sum $= 360°$

$x + 72 + 64 + 143 = 360$

$x + 279 = 360$

$x + 279 - 279 = 360 - 279$

$x = 81°$

c) Sum $= 720°$

$x + x + x + x + x + x = 720$

$6x = 720$

$\dfrac{6x}{6} = \dfrac{720}{6} \implies x = 120°$

2
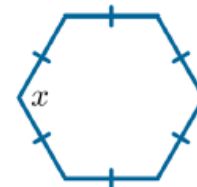
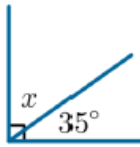**5.** Determine the value of angle x in each diagram.

a)
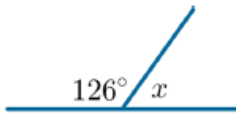
$126°$ x

angles total 180

$$x + 126 = 180$$
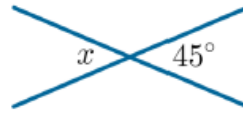
$$x + 126 - 126$$
$$= 180 - 126$$

$$x = 54°$$

b)

x $35°$

angles total 90

$$x + 35 = 90$$
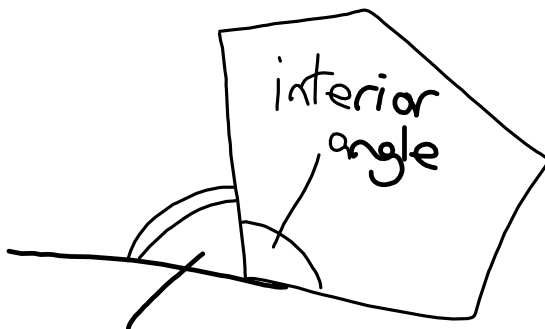
$$x + 35 - 35$$
$$= 90 - 35$$

$$x = 55°$$

c)

x $45°$

opposite angles are equal

$$\Rightarrow x = 45°$$

6. What is an *exterior angle of a polygon*? You may wish to support your explanation with a diagram.

interior angle

exterior angle

interior + exterior = 180

If you extended one side of a polygon the angle made between the extension and the adjacent side forms the exterior angle.

10. The sum of a polygon's interior angles is 1980°. How many sides does the polygon have?

$$\text{Sum of interior angles} = (n-2) \times 180$$

where n is the number of sides

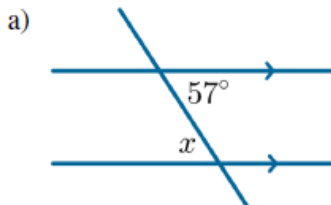$$\Rightarrow \frac{1980}{180} = \frac{(n-2) \times 180}{180}$$
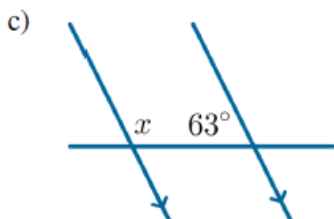
$$11 = n - 2$$

$$11 + 2 = n - 2 + 2$$

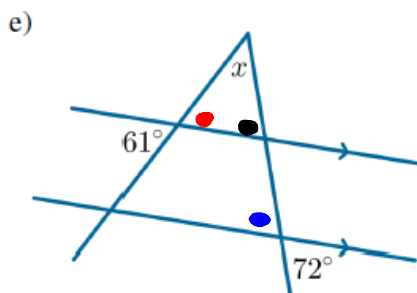$$13 = n$$

$\Rightarrow$ The polygon has 13 sides

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13. Determine the value of angle x in each diagram.

a)

57°
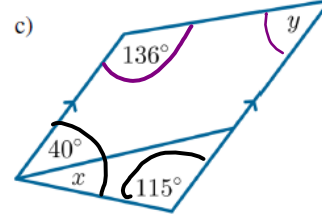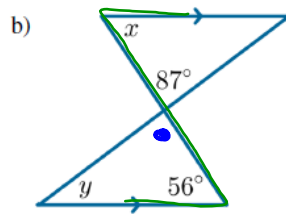
x

alternate angles are equal

$$\Rightarrow x = 57°$$

c)

x 63°

Co-interior angles total 180

$$\Rightarrow x + 63 = 180$$

$$x = 180 - 63$$

$$x = 117°$$

e)

x

61°

72°

$\bullet = 61°$ (opposite angles)

$\bullet = 72°$ (opposite angles)

$\bullet = 72°$ (corresponds to $\bullet$)

$$x = 180 - 61 - 72 \quad \Rightarrow x = 47°$$

14. Determine the values of angles x and y in each diagram.

b)

c)

$x = 56°$ (alternate angles)

$\bullet = 87°$ (opposite angles)

$y = 180 - 56 - 87$

$y = 37°$

$y + 136 = 180$ (cointerior angles)

$y = 180 - 136$
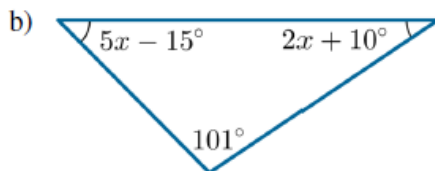
$y = 44°$

$x + 40 + 115 = 180$ (cointerior angles)

$x + 155 = 180$

$x = 180 - 155$

$x = 25°$

17. Determine the value of angle x in each diagram.

b)

$5x - 15°$ $2x + 10°$

$101°$

d)

$4x - 18°$

$(5x - 15) + (2x + 10) + 101 = 180$
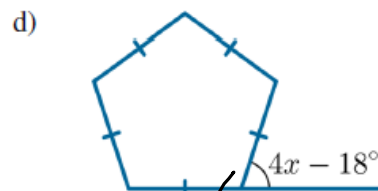
$5x - 15 + 2x + 10 + 101 = 180$

$7x + 96 = 180$

$7x + 96 - 96 = 180 - 96$

$\dfrac{7x}{7} = \dfrac{84}{7}$

$x = 12$

interior $= \dfrac{540}{5} = 108°$

$\Rightarrow 4x - 18 + 108 = 180$

$4x + 90 = 180$

$4x + 90 - 90 = 180 - 90$

$\dfrac{4x}{4} = \dfrac{90}{4}$

$x = 22.5$