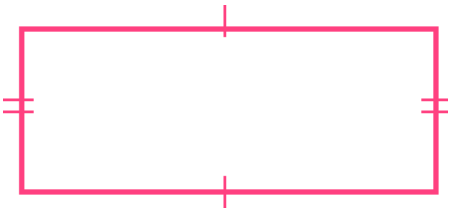
Polygons - Worksheet

Skill

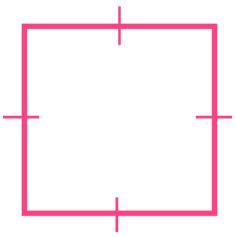
Group A - Names of polygons

State the name of the polygon.

1)

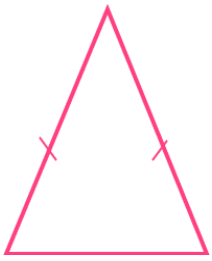


2)

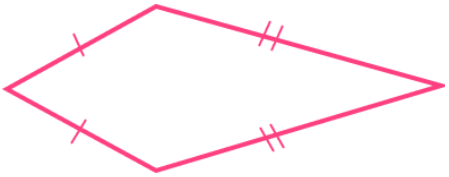


3)

4)



5)



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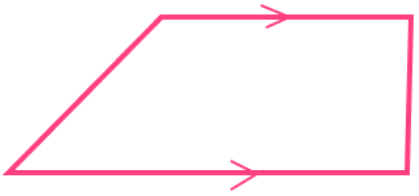
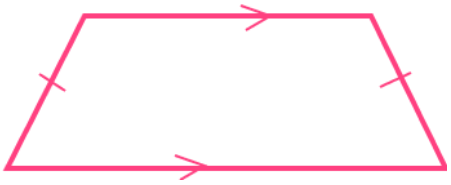
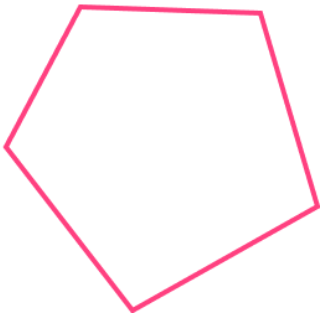


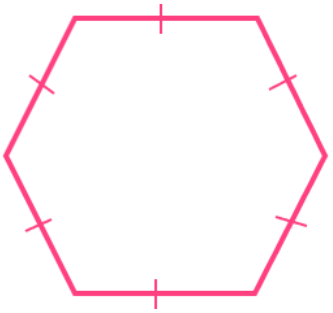
7)



8)



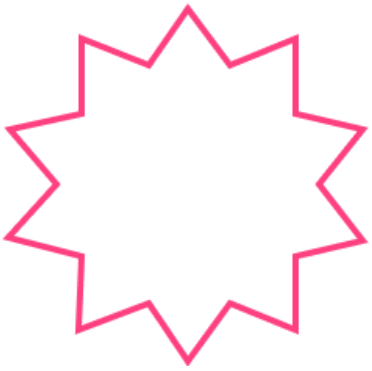
9)



10)

11)

12)



Polygons - Worksheet

Group B - Interior angles in regular polygons

Given the number of sides n, determine the interior and exterior angle for each regular polygon:

1) $n = 4$

2) $n = 3$

3) $n = 6$

4) $n = 5$

5) $n = 10$

6) $n = 12$

7) $n = 20$

8) $n = 45$

9) $n = 7$

10) $n = 11$

11) $n = 13$

12) $n = 21$

Group C - Properties of polygons

Determine the polygon from the description:

1)

- Four Equal Sides
- Diagonals are equal length

2)

- All four angles are equal
- Two lines of symmetry

3)

- Quadrilateral
- One pair of parallel sides
- No equal angles

4)

- 2 out of 3 angles are equal
- Two equal side lengths

5)

- Two pairs of equal sides only
- Opposing sides are parallel

6)

- All three angles are different
- No equal side lengths

7)

- All five side lengths are equal
- No parallel sides
- No lines overlap

8)

- Two pairs of equal sides only
- One line of symmetry
- No reflex angles

9)

- Two pairs of equal angles
- All side lengths are equal
- Diagonals bisect at 90°.

10)

- All six angles are obtuse
- All side lengths are equal
- Three pairs of parallel lines

11)

- One pair of parallel sides
- Two side lengths are equal
- One line of symmetry
- Quadrilateral

12)

- Two pairs of equal side lengths
- One line of symmetry
- Convex quadrilateral

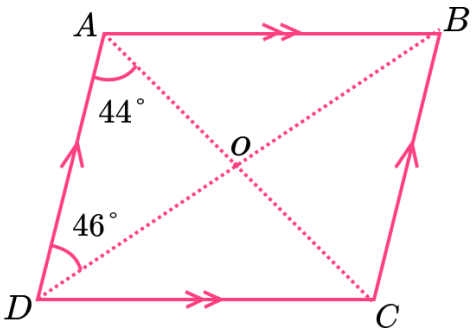
Polygons - Worksheet

Applied

1) **(a)** Below is a description of a quadrilateral. Use the description to determine the type of quadrilateral.

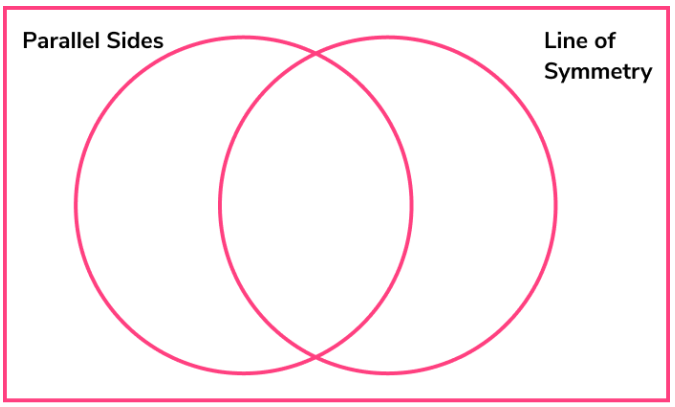
The quadrilateral has two pairs of equal side lengths. The diagonals meet at $90°$. The interior angles of the quadrilateral are: $30°$, $20°$, $20°$, and $290°$. The quadrilateral has one line of symmetry. Classify the quadrilateral.

(b) Classify the following polygon.



2) **(a)** Group the quadrilaterals in the list below to determine whether they have parallel sides and/or lines of symmetry.

	Quadrilateral
A	Square
B	Rectangle
C	Parallelogram
D	Rhombus
E	Kite
F	Trapezium
G	Isosceles Trapezium
H	Irregular
I	Arrowhead

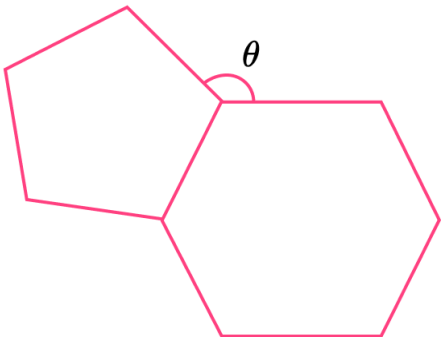


(b) What fraction of the listed quadrilaterals have at least 1 line of symmetry?

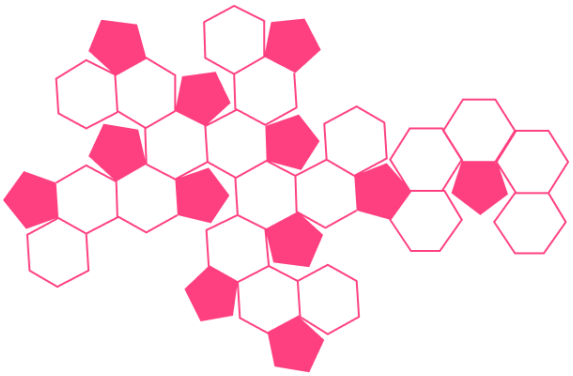
(c) What fraction of the listed quadrilaterals do not have parallel sides?

Polygons - Worksheet

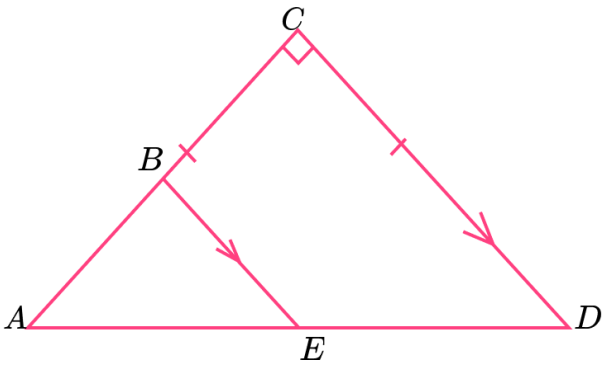
3) **(a)** A regular pentagon and a regular hexagon are joined together. Calculate the size of angle θ.



(b) Below is the net of a standard football. Do the polygons tessellate? Give a reason for your answer.



4) **(a)** ACD is a right angle isosceles triangle. The points B and E are midpoints of the sides AC and AD. Calculate the size of angle BEA. Explain your answer.



(b) A congruent triangle is joined to the side CD. If AC = 10cm, calculate the area of the new polygon.

Polygons - Exam Questions

1) **(a)** Calculate the external angle for a regular icosagon.

.....

(2)

(b) The external angle for a polygon is equal to 22.5°. How many sides does the polygon have?

.....

(2)

(4 marks)

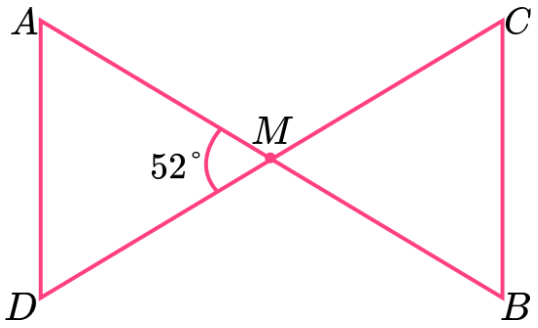
---

2) **(a)** Which of the following polygons have parallel sides. Circle all that apply.

Regular Pentagon Trapezium Regular Octagon Kite

(2)

(b) ABCD is a complex polygon where AM=MB and CM:MD = 1:1. Does the following polygon have parallel sides? Explain your answer.



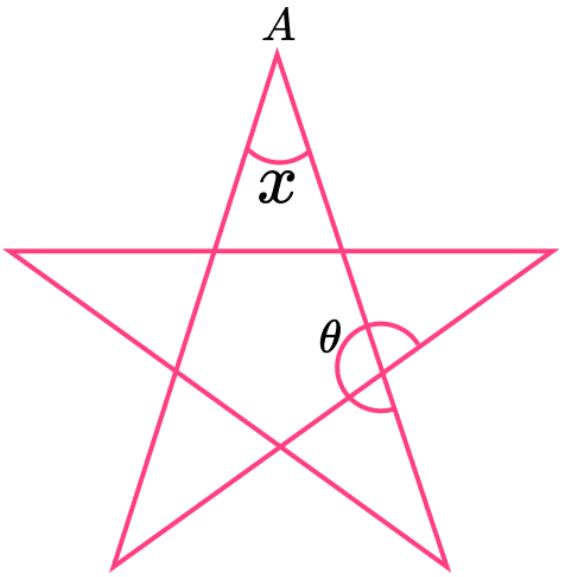
.....

(5)

(7 marks)

Polygons - Exam Questions

3) **(a)** A pentagram is a complex pentagon made up of 5 isosceles triangles and a regular pentagon. If the interior angle at point A is equal to x, write an expression for the size of angle θ?



.....

(1)

(b) Given that $\theta = 252^o$, calculate the size of angle x.

.....

(1)

(2 marks)

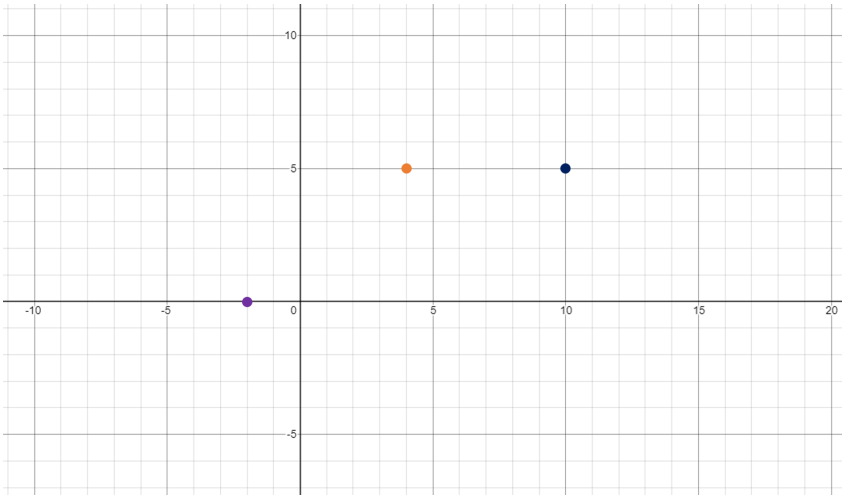
Polygons - Exam Questions

4) **(a)** The angles in a polygon are given as:
$4x + 20$, $5x + 19$, $3x + 32$, $6x + 18$, $2x + 41$, and $5x - 10$. By finding the value of x, classify the polygon.

.....

(6)

(b) The set of axes below has three coordinates plotted: A(-2,0), B(4,5), and C(10,5).



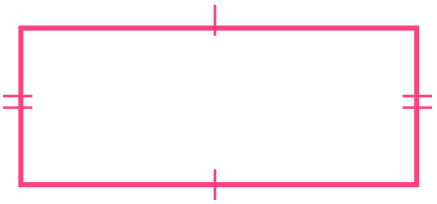
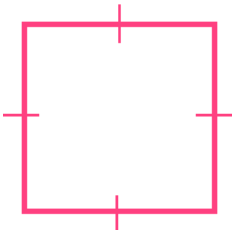
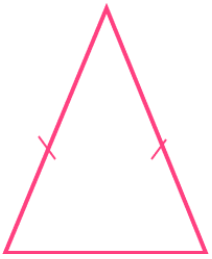
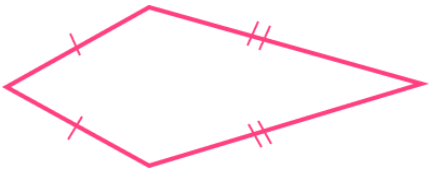
State the coordinates of the two points that would make an isosceles trapezium.

.....

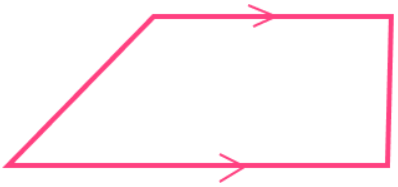
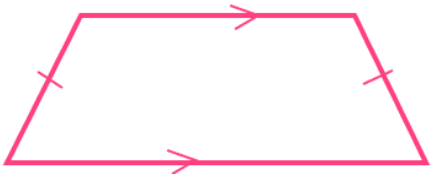
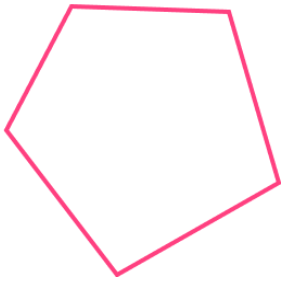
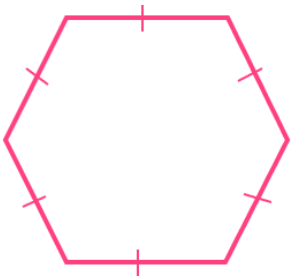
(2)

(8 marks)

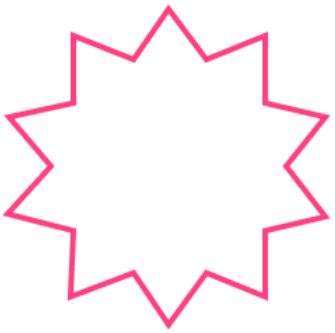
Polygons - Answers

	Question	Answer
	Skill Questions	
Group A	State the name of the polygon. **1)**  **2)**  **3)**  **4)**  **5)** 	**1)** Rectangle **2)** Square **3)** Parallelogram **4)** Isosceles Triangle **5)** Kite

Polygons - Answers

Group A contd	**6)** 	**6)** Trapezium
	7) 	**7)** Isosceles trapezium
	8) 	**8)** Pentagon
	9) 	**9)** Regular Hexagon
	10) 	**10)** Octagon

Polygons - Answers

Group A contd	**11)**  **12)** 	**11)** Pentagram **12)** Icosagon
Group B	Given the number of sides n, determine the interior and exterior angle for each regular polygon: **1)** $n = 4$ **2)** $n = 3$ **3)** $n = 6$ **4)** $n = 5$ **5)** $n = 10$ **6)** $n = 12$ **7)** $n = 20$ **8)** $n = 45$ **9)** $n = 7$ **10)** $n = 11$ **11)** $n = 13$ **12)** $n = 21$	**1)** $I = 90°, E = 90°$ **2)** $I = 60°, E = 120°$ **3)** $I = 120°, E = 60°$ **4)** $I = 108°, E = 72°$ **5)** $I = 144°, E = 36°$ **6)** $I = 150°, E = 30°$ **7)** $I = 162°, E = 18°$ **8)** $I = 172°, E = 8°$ **9)** $I = 128.6°, E = 51.4°$ **10)** $I = 147.3°, E = 32.7°$ **11)** $I = 152.3°, E = 27.7°$ **12)** $I = 162.9°, E = 17.1°$

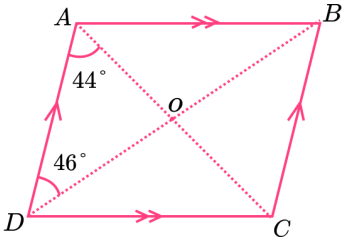
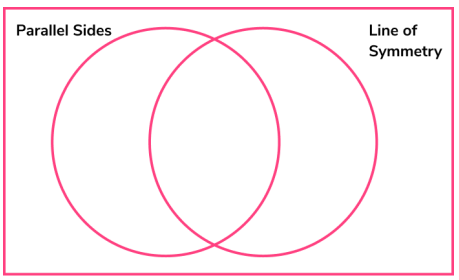
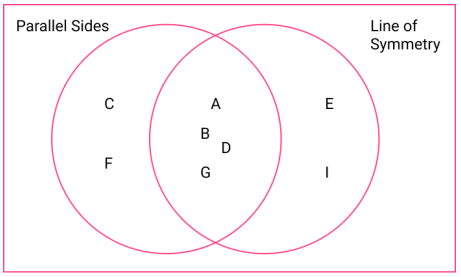
Polygons - Answers

Group C	Determine the polygon from the description	
	1) · Four Equal Sides · Diagonals are equal length	**1)** Square
	2) · All four angles are equal · Two lines of symmetry	**2)** Rectangle
	3) · Quadrilateral · One pair of parallel sides · No equal angles	**3)** Trapezium
	4) · 2 out of 3 angles are equal · Two equal side lengths	**4)** Isosceles Triangle
	5) · Two pairs of equal sides only · Opposing sides are parallel	**5)** Parallelogram
	6) · All three angles are different · No equal side lengths	**6)** Scalene Triangle
	7) · All five side lengths are equal · No parallel sides · No lines overlap	**7)** Pentagon
	8) · Two pairs of equal sides only · One line of symmetry · No reflex angles	**8)** Kite

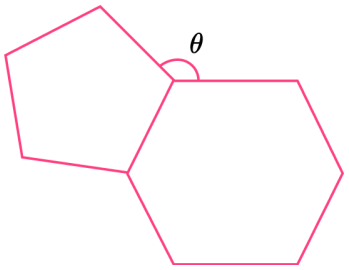
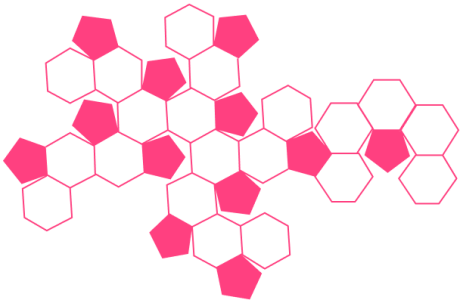
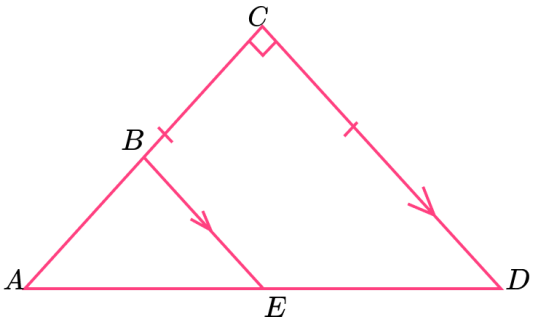
Polygons - Answers

Group C contd	**9)** · Two pairs of equal angles · All side lengths are equal · Diagonals bisect at 90°. **10)** · All six angles are obtuse · All side lengths are equal · Three pairs of parallel lines **11)** · One pair of parallel sides · Two side lengths are equal · One line of symmetry · Quadrilateral **12)** · Two pairs of equal side lengths · One line of symmetry · Convex quadrilateral	**9)** Rhombus **10)** Regular Hexagon **11)** Isosceles Trapezium **12)** Arrowhead

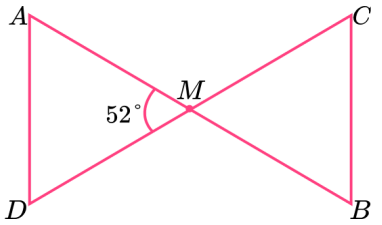
Polygons - Answers

	Question	Answer
	Applied Questions	
1)	**a)** Below is a description of a quadrilateral. Use the description to determine the type of quadrilateral. The quadrilateral has two pairs of equal side lengths. The diagonals meet at 90°. The interior angles of the quadrilateral are: 30°, 20°, 20°, and 290°. The quadrilateral has one line of symmetry. Classify the quadrilateral **b)** Classify the following polygon. 	**a)** Arrowhead **b)** Rhombus
2)	**a)** Group the quadrilaterals in the list below to determine whether they have parallel sides and/or lines of symmetry. |	Quadrilateral | | A | Square | | B | Rectangle | | C | Parallelogram | | D | Rhombus | | E | Kite | | F | Trapezium | | G | Isosceles Trapezium | | H | Irregular | | I | Arrowhead |  **b)** What fraction of the listed quadrilaterals have at least 1 line of symmetry? **c)** What fraction of the listed quadrilaterals do not have parallel sides?	**a)**  **b)** $\frac{6}{9} = \frac{2}{3}$ **c)** $\frac{3}{9} = \frac{1}{3}$

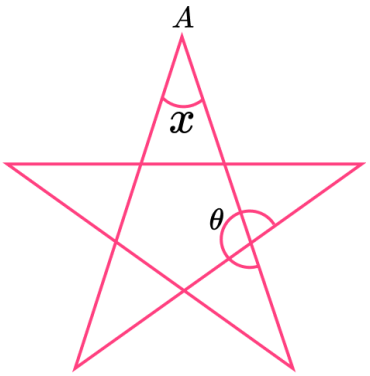
Polygons - Answers

3)	**a)** A regular pentagon and a regular hexagon are joined together. Calculate the size of angle θ.  **b)** Below is the net of a standard football. Do the polygons tessellate? Give a reason for your answer. 	**a)** $360 - (120 + 108) = 132°$ **b)** No. If they tessellated, the football would be flat. The angles at each vertex would total $108 + 120 + 120 = 348°$. For the polygons to tessellate, they should total $360°$.
4)	**a)** ACD is a right angle isosceles triangle. The points B and E are midpoints of the sides AC and AD. Calculate the size of angle BEA. Explain your answer.  **b)** A congruent triangle is joined to the side CD. If $AC = 10cm$, calculate the area of the new polygon.	**a)** As angle $ACD = 90°$ and ACD is an isosceles triangle, angle $CAD = 45°$. As CD is parallel to BE and AC is a straight line, angle ABE is corresponding to angle $ACD = 90°$. Angle $BEA =$ $180 - (90 + 45) = 45°$ as angles in triangles total $180°$. **b)** $20 \times 10 \div 2 = 100cm^2$

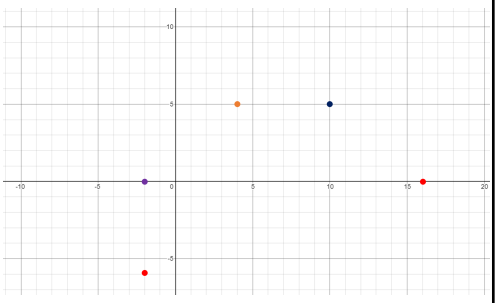
Polygons - Mark Scheme

	Question	Answer	
	Exam Questions		
1) (a)	Calculate the external angle for a regular icosagon.	(a) 20 sides $360 \div 20 = 18^o$	(1) (1)
(b)	The external angle for a polygon is equal to $22.5°$. How many sides does the polygon have?	(b) $360 \div 22.5 = 16$ 16 sides	(1) (1)
2) (a)	Which of the following polygons have parallel sides. Circle your answers. Regular Pentagon Trapezium Regular Octagon Kite	(a) Trapezium Regular Octagon	(1) (1)
(b)	$ABCD$ is a complex polygon where $AM = MB$ and $CM : MD = 1 : 1$. Does the following polygon have parallel sides? Explain your answer.  	(b) Vertically opposite angles are the same so angle $CMB = 52°$. As $AM = MB$ and $CM : MD = 1 : 1$, the lengths of AM, CM, BM, and DM are all equal so triangles AND and CMB are both isosceles, and congruent (SAS). Angle ABC = angle DAM = $(180 - 52) \div 2 = 64°$. As alternate angles are equal, AD is parallel to BC. Yes	(1) (1) (1) (1) (1)

Polygons - Mark Scheme

3) (a)	A pentagram is a complex pentagon made up of 5 isosceles triangles and a regular pentagon. If the interior angle at point A is equal to x, write an expression for the size of angle θ?  	**(a)** $288 - x$	**(1)**
(b)	Given that $\theta = 252°$, calculate the size of angle x.	**(b)** $288 - 252 = 36^o$	**(1)**
4) (a)	The angles in a polygon are given as: $4x + 20$, $5x + 19$, $3x + 32$, $6x + 18$, $2x + 41$, and $5x - 10$. By finding the value of x, classify the polygon.	**(a)** $180(6 - 2) = 720^o$ $4x + 20 + 5x + 19 + 3x + 32 + 6x + 18 + 2x + 41 + 5x - 10 = 720$ $x = 24^o$ $4x + 20 = 116^o$ $3x + 32 = 104^o$ $5x + 19 = 139^o$ $6x + 18 = 162^o$ $2x + 41 = 89^o$ $5x - 10 = 110^o$ For minimum 3 correct angles All angles correct Irregular Hexagon	**(1)** **(1)** **(1)** **(1)** **(1)** **(1)**

Polygons - Mark Scheme

(b)	The set of axes below has three coordinates plotted: $A(-2, 0)$, $B(4, 5)$, and $C(10, 5)$.  State the coordinates of the two points that would make an isosceles trapezium.	**(b)** $(16, 0)$ (Isosceles) trapezium $(-2, -6)$ (Isosceles) trapezium	**(1)** **(1)**