Unit 8: Geometry

The book.

Chapter 3

Check in

1 a vi, ix   b viii, x   c i, ii, xi
   d iii, iv   e v, vii, xii

2 a A, D, G, L   b C, I, K   c A, B, D, E, G, J, L
   d A, D, G, L   e D, E, G

Exercise 3A

1 pentagon 5, hexagon 6, octagon 8

2 pentagon 5, hexagon 6, octagon 8

3 3 and 3

4 a All of the angles in a regular pentagon are 108 degrees

   b All of the angles in a regular hexagon are 120 degrees

   c All of the angles in a regular octagon are 135 degrees

5

Name of regular Polygon	Number of sides	Number of lines of symmetry	Order of rotational symmetry
Square	4	4	4
Hexagon	6	6	6
Octagon	8	8	8
Pentagon	5	5	5

The number of lines of symmetry equals the order of rotational symmetry for regular polygons

6 20

Exercise 3B

1 a yes

2 a yes   b yes   c no

3 a yes   b yes

4 a ABC and QRP, KLM and GJH, XYZ and TSU, DEF and NVW

   c KLM and GJH, XYZ and TSU, DEF and NVW

5 a angle Q

   b angle A → angle Q, angle B → angle R, angle C → angle P

6 angle K → angle G, angle L → angle J, angle M → angle H, angle X → angle T, angle Y → angle S, angle Z → angle U; angle D → angle N, angle E → angle V, angle F → angle W

7 a QR   b AB → QR, BC → RP, CA → PQ

8 KL → GJ, LM → JH, MK → HG;
   XY → TS, YZ → SU, ZX → UT;
   DE → NV, EF → VW, FD → WN

9 a yes

   b Both triangles have the same angles and side lengths

   c angle A → angle F, angle B → angle E, angle C → angle D

   d AB → EF, BC → ED, CA → DF

   e because the triangles are congruent or identically equal

10 a yes

   b angle H → angle N, angle J → angle M, angle K → angle L;
      HJ → NM, JK → ML, KH → LN

   c ΔJHK ≡ ΔMNL

11 a RS = 6.3 cm, UV = 5 cm

   b i angle RTS = 65°   ii angle VUW = 70°

   c angle UWV, 45°

   d ST

12 a 22°

   b angle E = 52°, angle D = 106°, angle F = 22°

   c KL = 6 m, KM = 12 cm

13 AB = 7 cm, AC = 5 cm, angle BAC = 100° is a possible solution, but it depends how ΔABC is orientated and labelled

Exercise 3C

1 **a** chord   **b** diameter   **c** chord

2 This would be longer than the diameter so is not possible.

3 **a** If you extend AB it will cross the circle at a second point so it cannot be a tangent. The angle between AB and the radius is not a right angle.

b
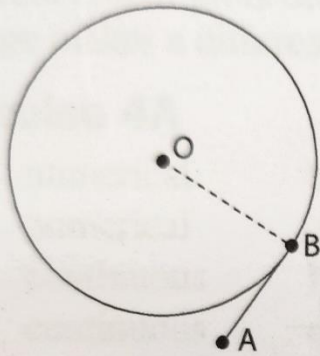
4 Sometimes true

The radius is longer than a chord that doesn't pass through the centre.

The tangent is longer than the diameter.

The diameter and a tangent are parallel.

The circumference is longer than a tangent.

Always true

The diameter is longer than a chord that doesn't pass through the centre.

The tangent at point B and the radius to point B are perpendicular to each other.

The circumference is longer than the diameter.

Never true

The radius is longer than the diameter.

The radius is longer than the circumference.

Exercise 3D

1 cuboids are i, ii, v, vi; triangular prisms are iv, vii;
   other prisms are iii, viii, ix

2 All cubes are prisms but all prisms are not cubes

3 a

Shape	Number of vertices	Number of faces	Number of edges
1. Cuboid	8	6	12
2. Cuboid	8	6	12
3. Pentagonal prism	10	7	15
4. Triangular prism	6	5	9
5. Cuboid	8	6	12
6. Cuboid	8	6	12
7. Triangular prism	6	5	9
8. Octagonal prism	16	10	24
9. Hexagonal prism	12	8	18

   b In any prism the number of edges is always a multiple of 3.
   In any prism the number of faces is always 2 more than the
   number of edges of the end face.

4 a B, F, G   b A, C, D, E

5 a A, B   b A, B, C, D, E
   c E, F, G   d E
   e B, E, F, G   f C

6 a

Shape	Number of vertices	Number of faces	Number of edges
A	12	8	18
B	7	7	12
C	8	6	12
D	8	6	12
E	6	5	9
F	4	4	6
G	5	5	8

b In any pyramid the number of edges is always an **even** number.
In any pyramid the number of faces and the number of vertices is **the same**.

In any pyramid if you halve the number of edges and then add 1 to this number you get the number of **faces or vertices**.

7 number of vertices + number of faces = number of edges + 2

8 a and b are cylinders

9 a 0   **b** 2   **c** curved   **d** circles

10 a 1   **b** 1   **c** 1

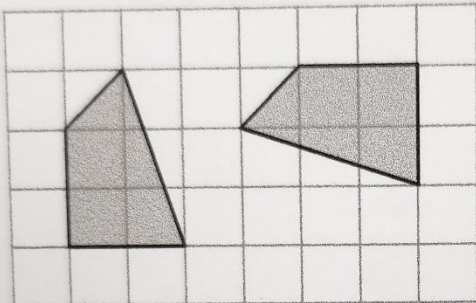**11 a** 0   **b** 1   **c** 0   **d** 0

Homework book.

3A

1 a pentagon   **b** octagon   **c** nonagon

2 a heptagon, 7, 7   **b** pentagon, 5, 5
    c decagon, 10, 10   **d** hexagon, 6, 6

3 a 3 angles of 120° make 360°
    b 360° cannot be made from multiples of 108°
    c Yes, 135° + 135° + 90° = 360°

3B

1 Possible answers:

2 A and H, B and K, C and M, D and F, E and I, J and L, G and N

3 a $\hat{A} \rightarrow \hat{P}$ **b** $\hat{B} \rightarrow \hat{Q}$
    c $\hat{C} \rightarrow \hat{R}$ **d** AB → PQ
    e BC → QR   **f** AC → PR

4 a 5 cm, 12 cm
    b i 30°   **ii** 135°
    c $D\hat{F}E$, 15°
    d EF

5 AB = DC, AD = BC, AC is common to both triangles

3C

1 a G   **b** E   **c** A   **d** B
    e D   **f** F   **g** C   **h** H

2 perpendicular

3 He is not correct. A segment can be greater than half a circle.

3D–3E

1 a

Shape	Vertices (V)	Faces (F)	Edges (E)
i	8	6	12
ii	5	5	8
iii	10	7	15
iv	12	8	18
v	8	6	12
vi	6	8	12

b $V + F = E + -$ or $V + F - 2 = E$

c i   **d i, iii, iv** and **v**   **e ii**

2 a Students' diagrams   **b** circular prism

    c 1   **d** 2

3 a 7   **b** 7

4 a 9   **b** 16

5 a 16   **b** 10