Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Circles, arcs and sectors

Time allowed: 40 minutes

Subject code **0580**

Mathematics

Questions from Paper 1 and Paper 2

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.
You may use a calculator.

Total marks

/ 31

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.
- Unless a question says otherwise, give answers that are not exact to 3 significant figures, and angles in degrees to 1 decimal place.

Information

- This paper has 10 questions worth 31 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 The diameter of a circle is 16 cm.

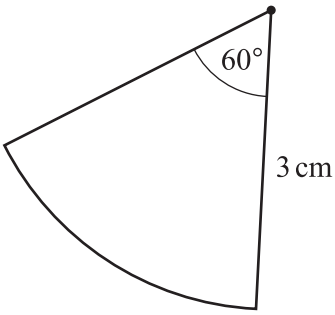
Find the area of the circle.
Leave your answer in terms of π.

..... cm^2 [2]

Area and circumference of circles Click for more variations

1	64π	**2**	**M1** for $\left(\frac{16}{2}\right)^2$

2



NOT TO SCALE

The diagram shows a sector of a circle with radius 3 cm and sector angle 60°.

Calculate the area of the sector.
Give your answer in terms of π in its simplest form.

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..... cm^2 [2]

Arc length and sector area Click for more variations

2	$\frac{3}{2}\pi$, $1\frac{1}{2}\pi$, or 1.5π	**2**	**M1** for $\frac{60}{360}\times\pi\times3^2$ oe

3 A circle has radius 7 cm.
A square has side x cm.
The circumference of the circle is the same length as the perimeter of the square.

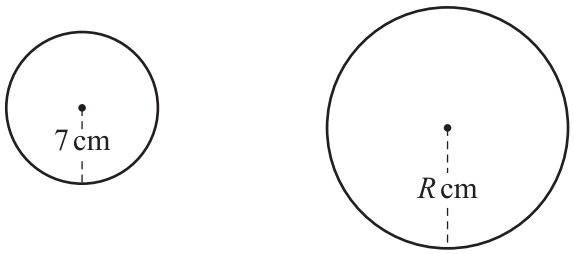
Find the value of x.
Give your answer in terms of π.

$x =$ ..... [3]

Area and circumference of circles Click for more variations

3	$\frac{7\pi}{2}$ or 3.5π	**3**	**M2** for $2\pi\times7=4x$ oe or **M1** for $2\pi\times7$ or 14π or $4x$

4



NOT TO SCALE

The diagram shows a small circle with radius 7 cm and a large circle with radius R cm.
The area of 16 small circles is the same as the area of one large circle.

Calculate the value of R.

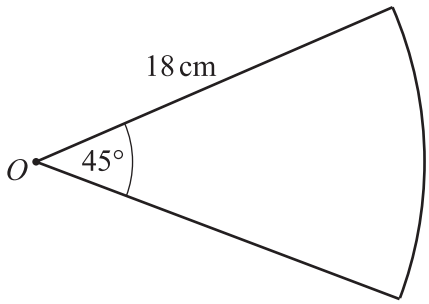
$R =$ ..... [3]

Area and circumference of circles Click for more variations

4	28	**3**	**M2** for $16\times\pi7^2=\pi R^2$ or better or **M1** for $\pi7^2$

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5



NOT TO SCALE

The diagram shows a sector of a circle, centre O.
The length of the arc is $n\pi$ cm .

Find the value of n.

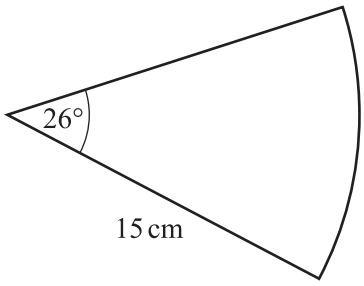
$n =$ ..... [2]

Arc length and sector area Click for more variations

5	$\frac{9}{2}$ oe	**2**	**M1** for $\frac{45}{360}\times 2\times[\pi]\times 18$ oe

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6



NOT TO SCALE

The diagram shows a sector of a circle with radius 15 cm.

Calculate the perimeter of this sector.

Answer ..... cm [3]

Arc length and sector area Click for more variations

6	36.8 or 36.80 to 36.81	**3**	**M1** for $\frac{26}{360} \times 2 \times \pi \times 15$ **M1** for 2×15 + a term involving π

7 The perimeter of a sector of a circle with radius 8 cm is 26 cm.

Calculate the angle of this sector.

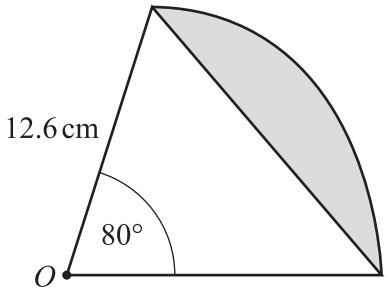
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..... [3]

Arc length and sector area Click for more variations

7	71.6 or 71.61 to 71.62	**3**	**M2** for $\frac{\text{angle}}{360} = \frac{26-8-8}{2\pi \times 8}$ or better or **M1** for $\frac{\text{angle}}{360} \times 2\pi \times 8$ oe

8



NOT TO SCALE

The diagram shows a sector of a circle, centre O, radius 12.6 cm.

Calculate the perimeter of the shaded segment.

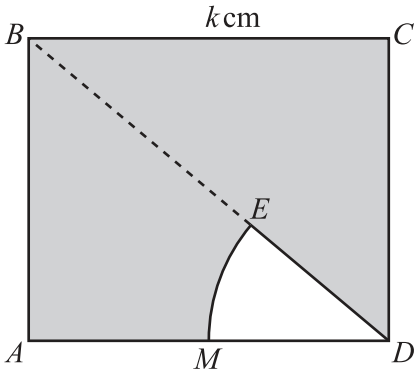
..... cm [4]

Arc length and sector area Click for more variations

8	33.8 or 33.78 to 33.80	**4**	**M2** for $2\times12.6\times\sin 40$ oe or **M1** for $\sin 40=\frac{(...)}{12.6}$ oe **M1** for $\frac{80}{360}\times2\times\pi\times12.6$ oe

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9



NOT TO SCALE

The diagram shows a square $ABCD$ with side length k cm.
MDE is a sector of a circle, centre D.
E lies on the diagonal, BD, of the square.
M is the midpoint of AD.

Find the percentage of the square that is shaded.

..... % [4]

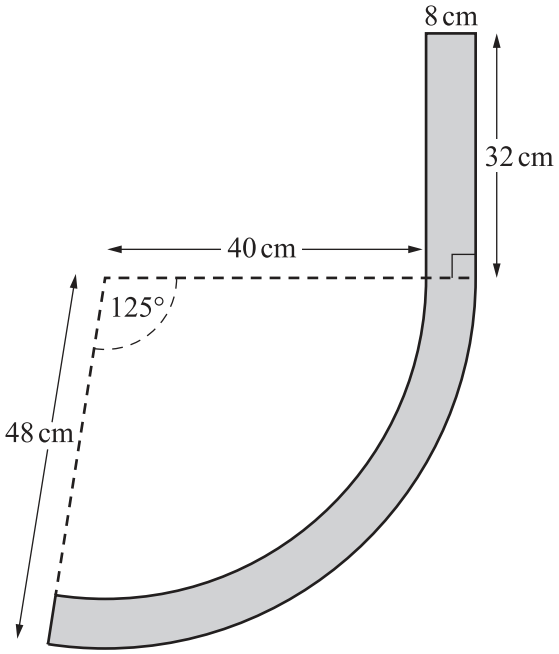
Arc length and sector area Click for more variations

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9	90.2 or 90.18…	**4**	**B3** for 9.82[%] OR **M3** for $[100\times]\left(k^2-\frac{45}{360}\times\pi\times\left(\frac{k}{2}\right)^2\right)\div k^2$ oe or **M2** for $[100\times]\frac{45}{360}\times\pi\times\left(\frac{k}{2}\right)^2\div k^2$ oe or $k^2-\frac{45}{360}\times\pi\times\left(\frac{k}{2}\right)^2$ or $100\times(k^2-m\pi k^2)\div k^2$ or **M1** for $\frac{c}{360}\times\pi\times\left(\frac{k}{2}\right)^2$ oe or for $(k^2-m\pi k^2)\div k^2$ or for $100\times(k^2-mk^2)\div k^2$

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10



NOT TO SCALE

The diagram shows the cross section of part of a park bench.
It is made from a rectangle of length 32 cm and width 8 cm and a curved section.
The curved section is made from two concentric arcs with sector angle 125°.
The inner arc has radius 40 cm and the outer arc has radius 48 cm.

Calculate the area of the cross section correct to the nearest square centimetre.

..... cm^2 [5]

Arc length and sector area Click for more variations

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10	1024 cao	**5**	**B4** for 1023 to 1024.0… or 1020 or **M3** for $\frac{125}{360}\times\pi\times48^2-\frac{125}{360}\times\pi\times40^2+32\times8$ or **M1** for $\frac{125}{360}\times\pi\times48^2$ or $\frac{125}{360}\times\pi\times40^2$ **and M1** for $32\times8+k\pi$ If B0 scored **B1** for *their* more accurate decimal answer rounded correctly to an integer

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