2. *[Maximum mark: 6]*

The diagram below shows triangle PQR. The length of [PQ] is 7 cm, the length of [PR] is 10 cm, and $\hat{PQR}$ is 75°.

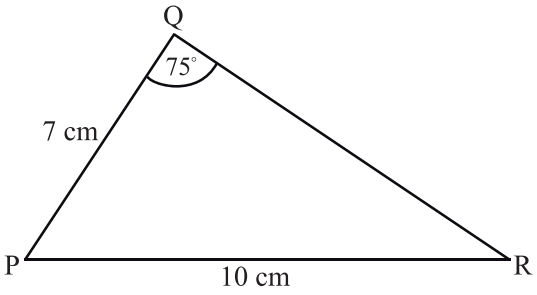

diagram not to scale

(a) Find $\hat{PRQ}$. *[3 marks]*

(b) Find the area of triangle PQR. *[3 marks]*

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3. *[Maximum mark: 6]*

The diagram below shows a circle centre O, with radius *r*. The length of arc ABC is 3π cm and $\text{A}\hat{\text{O}}\text{C} = \frac{2\pi}{9}$.

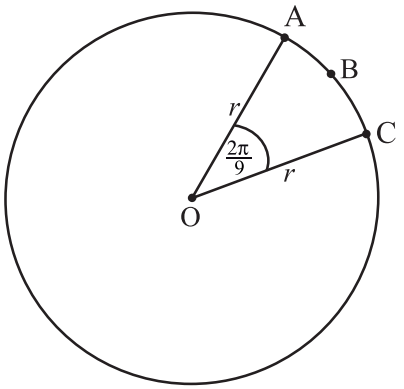

diagram not to scale

(a) Find the value of *r*. *[2 marks]*

(b) Find the perimeter of sector OABC. *[2 marks]*

(c) Find the area of sector OABC. *[2 marks]*

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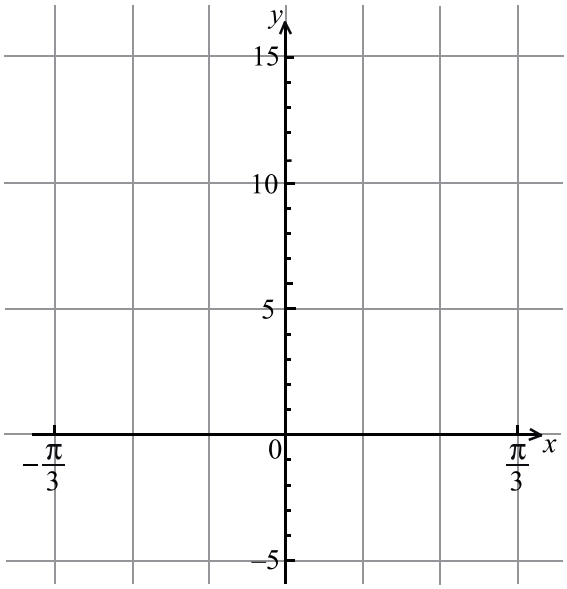
4. *[Maximum mark: 6]*

Let $f(x) = 4\tan^2 x - 4\sin x$, $-\frac{\pi}{3} \leq x \leq \frac{\pi}{3}$.

(a) On the grid below, sketch the graph of $y = f(x)$. *[3 marks]*



(b) Solve the equation $f(x) = 1$. *[3 marks]*

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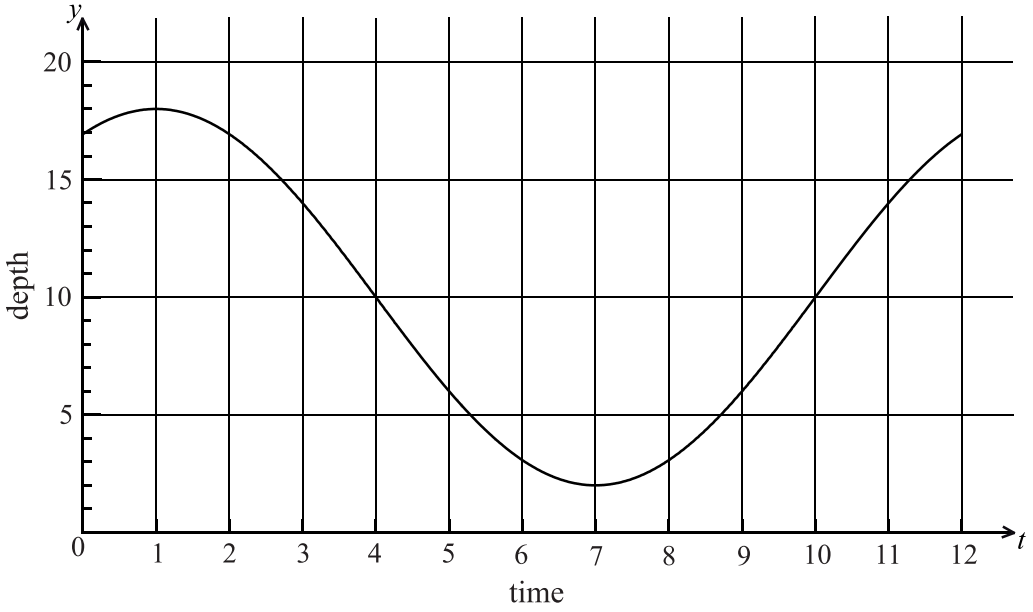
SECTION B

*Answer **all** the questions on the answer sheets provided. Please start each question on a new page.*

8. *[Maximum mark: 11]*

The following graph shows the depth of water, y metres, at a point P, during one day. The time t is given in hours, from midnight to noon.



(a) Use the graph to write down an estimate of the value of t when

(i) the depth of water is minimum;

(ii) the depth of water is maximum;

(iii) the depth of the water is increasing most rapidly. *[3 marks]*

(b) The depth of water can be modelled by the function $y = A\cos(B(t-1)) + C$.

(i) Show that $A = 8$.

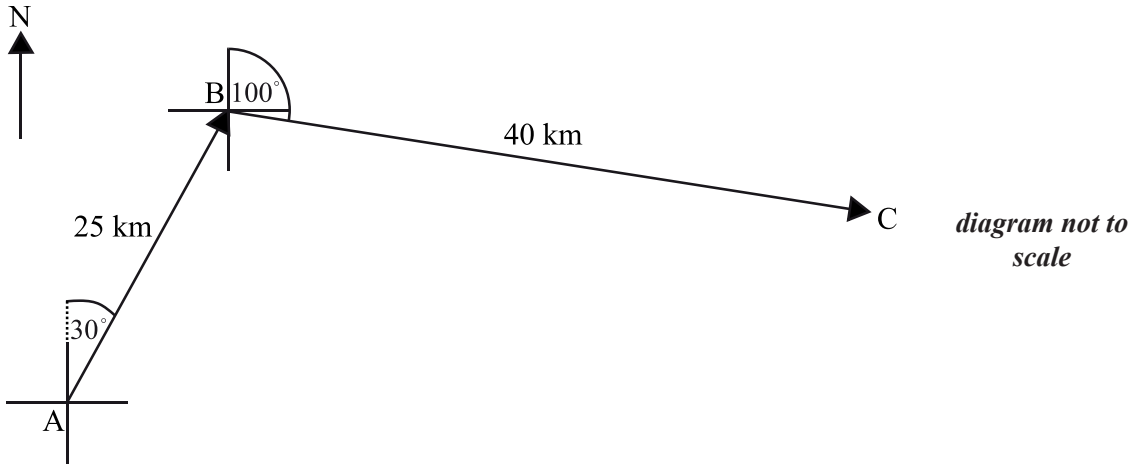
(ii) Write down the value of C.

(iii) Find the value of B. *[6 marks]*

(c) A sailor knows that he cannot sail past P when the depth of the water is less than 12 m. Calculate the values of t between which he cannot sail past P. *[2 marks]*

6. *[Maximum mark: 7]*

A ship leaves port A on a bearing of 030°. It sails a distance of 25 km to point B. At B, the ship changes direction to a bearing of 100°. It sails a distance of 40 km to reach point C. This information is shown in the diagram below.



A second ship leaves port A and sails directly to C.

(a) Find the distance the second ship will travel. *[4 marks]*

(b) Find the bearing of the course taken by the second ship. *[3 marks]*

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2. *[Maximum mark: 7]*

The circle shown has centre O and radius 3.9 cm.

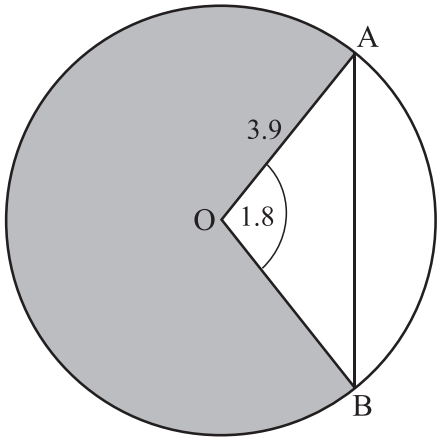

diagram not to scale

Points A and B lie on the circle and angle AOB is 1.8 radians.

(a) Find AB. *[3 marks]*

(b) Find the area of the shaded region. *[4 marks]*

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4. *[Maximum mark: 8]*

The diagram below shows a triangle ABD with $AB = 13$ cm and $AD = 6.5$ cm.
Let C be a point on the line BD such that $BC = AC = 7$ cm.

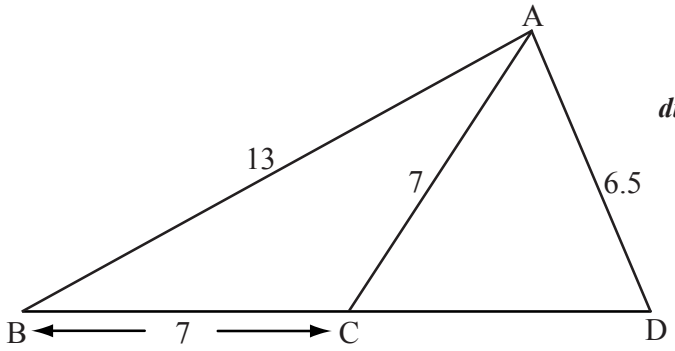

diagram not to scale

(a) Find the size of angle ACB. *[3 marks]*

(b) Find the size of angle CAD. *[5 marks]*

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SECTION B

*Answer **all** the questions on the answer sheets provided. Please start each question on a new page.*

8. *[Maximum mark: 13]*

The following diagram shows a circle with centre O and radius 4 cm.

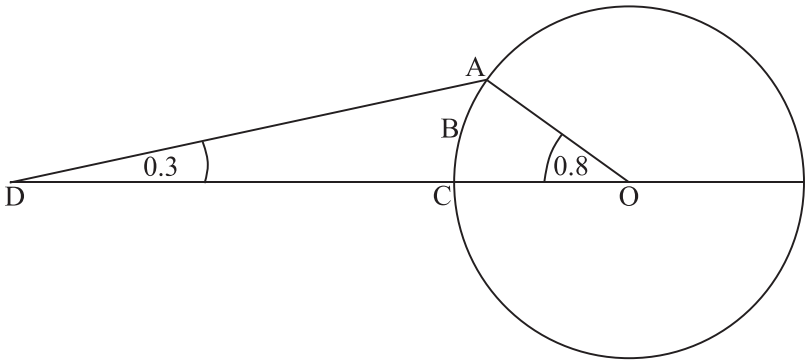


diagram not to scale

The points A, B and C lie on the circle. The point D is outside the circle, on (OC). Angle ADC = 0.3 radians and angle AOC = 0.8 radians.

(a) Find AD. *[3 marks]*

(b) Find OD. *[4 marks]*

(c) Find the area of sector OABC. *[2 marks]*

(d) Find the area of region ABCD. *[4 marks]*

*Do **NOT** write on this page.*

9. *[Maximum mark: 15]*

Let $f(x) = 5\cos\frac{\pi}{4}x$ and $g(x) = -0.5x^2 + 5x - 8$, for $0 \le x \le 9$.

(a) On the same diagram, sketch the graphs of f and g. *[3 marks]*

(b) Consider the graph of f. Write down

(i) the x-intercept that lies between $x = 0$ and $x = 3$;

(ii) the period;

(iii) the amplitude. *[4 marks]*

(c) Consider the graph of g. Write down

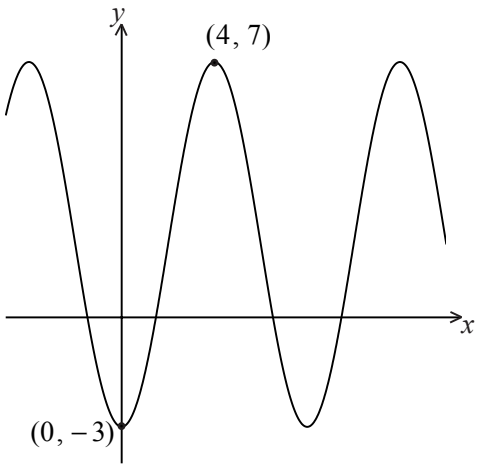
(i) the two x-intercepts;

(ii) the equation of the axis of symmetry. *[3 marks]*

(d) Let R be the region enclosed by the graphs of f and g. Find the area of R. *[5 marks]*

5. *[Maximum mark: 7]*

The graph of $y = p\cos qx + r$, for $-5 \le x \le 14$, is shown below.



There is a minimum point at $(0, -3)$ and a maximum point at $(4, 7)$.

(a) Find the value of

(i) p;

(ii) q;

(iii) r. *[6 marks]*

(b) The equation $y = k$ has exactly **two** solutions. Write down the value of k. *[1 mark]*

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SECTION B

*Answer **all** the questions on the answer sheets provided. Please start each question on a new page.*

8. *[Maximum mark: 14]*

The diagram below shows a quadrilateral ABCD with obtuse angles $\hat{ABC}$ and $\hat{ADC}$.

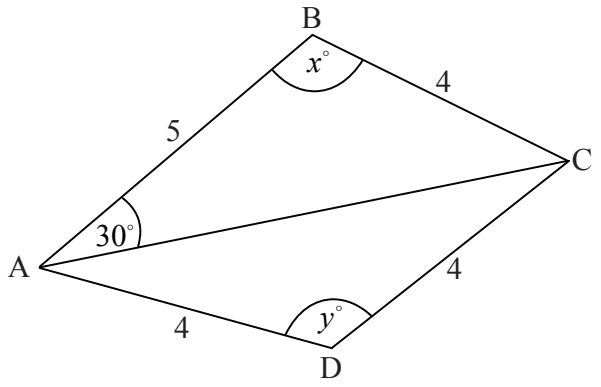

diagram not to scale

$AB = 5$ cm, $BC = 4$ cm, $CD = 4$ cm, $AD = 4$ cm, $B\hat{A}C = 30^\circ$, $A\hat{B}C = x^\circ$, $A\hat{D}C = y^\circ$.

(a) Use the cosine rule to show that $AC = \sqrt{41 - 40\cos x}$. *[1 mark]*

(b) Use the sine rule in triangle ABC to find another expression for AC. *[2 marks]*

(c) (i) Hence, find x, giving your answer to two decimal places.

(ii) Find AC. *[6 marks]*

(d) (i) Find y.

(ii) Hence, or otherwise, find the area of triangle ACD. *[5 marks]*

6. *[Maximum mark: 7]*

The following diagram shows the triangle ABC.

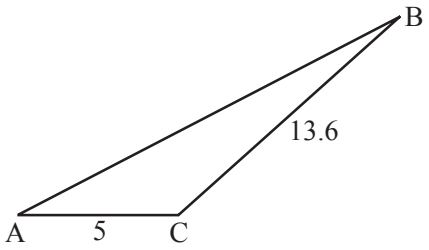

diagram not to scale

The angle at C is obtuse, $AC = 5$ cm, $BC = 13.6$ cm and the area is 20 cm^2.

(a) Find $A\hat{C}B$. *[4 marks]*

(b) Find AB. *[3 marks]*

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Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. In particular, solutions found from a graphic display calculator should be supported by suitable working, e.g. if graphs are used to find a solution, you should sketch these as part of your answer. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. You are therefore advised to show all working.

SECTION A

*Answer **all** questions in the boxes provided.*

1. *[Maximum mark: 6]*

The following diagram shows triangle ABC.

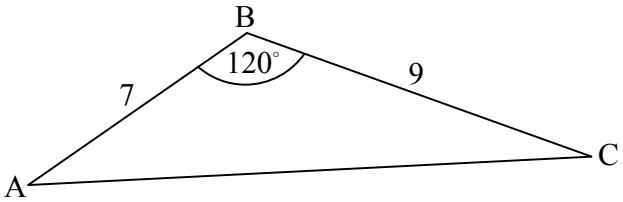

diagram not to scale

$AB = 7\,\text{cm}$, $BC = 9\,\text{cm}$ and $A\hat{B}C = 120^\circ$.

(a) Find AC. *[3 marks]*

(b) Find $B\hat{A}C$. *[3 marks]*

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*Do **NOT** write solutions on this page. Any working on this page will **NOT** be marked.*

SECTION B

*Answer **all** questions on the answer sheets provided. Please start each question on a new page.*

8. *[Maximum mark: 14]*

The following diagram shows a waterwheel with a bucket. The wheel rotates at a constant rate in an anticlockwise (counterclockwise) direction.

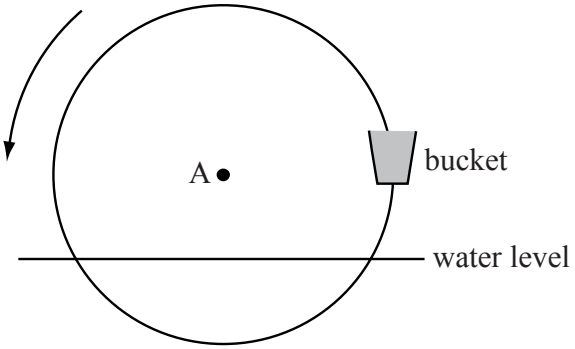


diagram not to scale

The diameter of the wheel is 8 metres. The centre of the wheel, A, is 2 metres above the water level. After t seconds, the height of the bucket above the water level is given by $h = a\sin bt + 2$.

(a) Show that $a = 4$. *[2 marks]*

The wheel turns at a rate of one rotation every 30 seconds.

(b) Show that $b = \frac{\pi}{15}$. *[2 marks]*

In the first rotation, there are two values of t when the bucket is **descending** at a rate of $0.5\ \text{m s}^{-1}$.

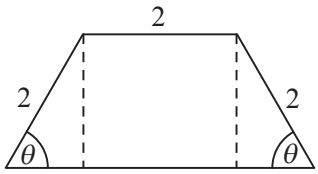
(c) Find these values of t. *[6 marks]*

(d) Determine whether the bucket is underwater at the second value of t. *[4 marks]*

*Do **NOT** write solutions on this page. Any working on this page will **NOT** be marked.*

10. *[Maximum mark: 16]*

The diagram below shows a plan for a window in the shape of a trapezium.



Three sides of the window are 2 m long. The angle between the sloping sides of the window and the base is θ, where $0 < \theta < \frac{\pi}{2}$.

(a) Show that the area of the window is given by $y = 4\sin\theta + 2\sin 2\theta$. *[5 marks]*

(b) Zoe wants a window to have an area of 5 m^2. Find the two possible values of θ. *[4 marks]*

(c) John wants two windows which have the same area A but different values of θ.

Find all possible values for A. *[7 marks]*

3. *[Maximum mark: 6]*

Consider the following circle with centre O and radius 6.8 cm.

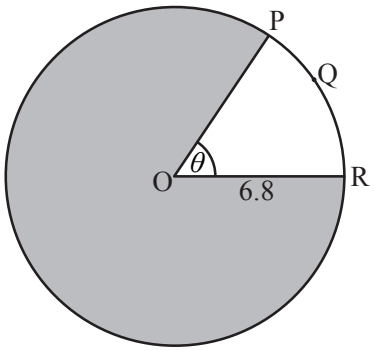


diagram not to scale

The length of the arc PQR is 8.5 cm.

(a) Find the value of θ. *[2 marks]*

(b) Find the area of the shaded region. *[4 marks]*

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4. *[Maximum mark: 6]*

Consider the triangle ABC, where $AB = 10$, $BC = 7$ and $C\hat{A}B = 30^\circ$.

(a) Find the two possible values of $A\hat{C}B$. *[4 marks]*

(b) Hence, find $A\hat{B}C$, given that it is acute. *[2 marks]*

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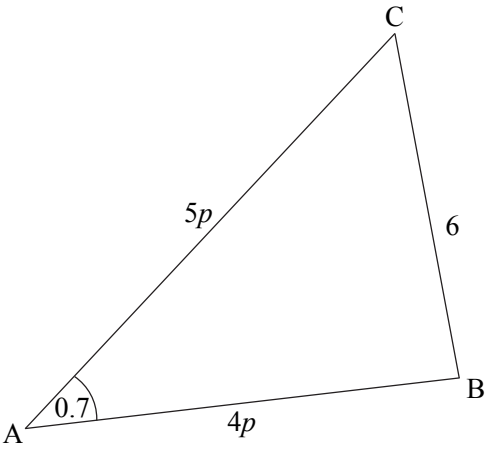
*Do **NOT** write solutions on this page.*

9. *[Maximum mark: 15]*

The following diagram shows a triangle ABC.

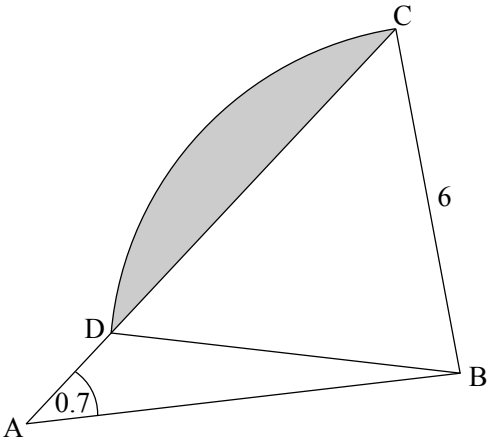


$\text{BC} = 6$, $\text{C}\hat{\text{A}}\text{B} = 0.7$ radians, $\text{AB} = 4p$, $\text{AC} = 5p$, where $p > 0$.

(a) (i) Show that $p^2(41 - 40\cos 0.7) = 36$.

(ii) Find p. *[4 marks]*

Consider the circle with centre B that passes through the point C. The circle cuts the line CA at D, and $\text{A}\hat{\text{D}}\text{B}$ is obtuse. Part of the circle is shown in the following diagram.



(b) Write down the length of BD. *[1 mark]*

(c) Find $\text{A}\hat{\text{D}}\text{B}$. *[4 marks]*

(d) (i) Show that $\text{C}\hat{\text{B}}\text{D} = 1.29$ radians, correct to 2 decimal places.

(ii) Hence, find the area of the shaded region. *[6 marks]*

Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. In particular, solutions found from a graphic display calculator should be supported by suitable working, e.g. if graphs are used to find a solution, you should sketch these as part of your answer. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. You are therefore advised to show all working.

SECTION A

*Answer **all** questions in the boxes provided. Working may be continued below the lines if necessary.*

1. *[Maximum mark: 6]*

The following diagram shows ΔPQR, where $RQ = 9$ cm, $P\hat{R}Q = 70^\circ$ and $P\hat{Q}R = 45^\circ$.

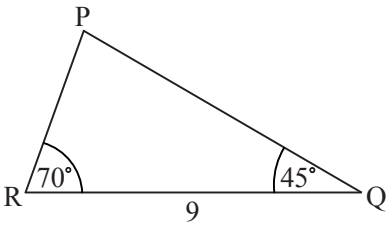


diagram not to scale

(a) Find $R\hat{P}Q$. *[1 mark]*

(b) Find PR. *[3 marks]*

(c) Find the area of ΔPQR. *[2 marks]*

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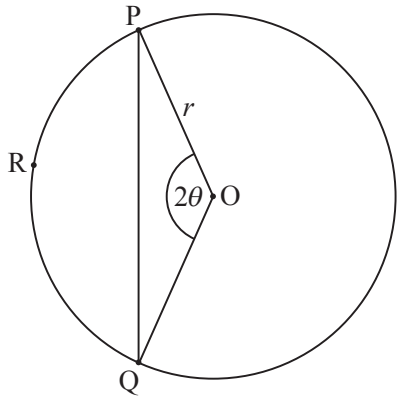
*Do **NOT** write solutions on this page.*

10. *[Maximum mark: 16]*

Consider the following circle with centre O and radius r.



The points P, R and Q are on the circumference, $\text{P}\hat{\text{O}}\text{Q} = 2\theta$, for $0 < \theta < \frac{\pi}{2}$.

(a) Use the cosine rule to show that $\text{PQ} = 2r\sin\theta$. *[4 marks]*

Let l be the length of the arc PRQ.

(b) Given that $1.3\,\text{PQ} - l = 0$, find the value of θ. *[5 marks]*

Consider the function $f(\theta) = 2.6\sin\theta - 2\theta$, for $0 < \theta < \frac{\pi}{2}$.

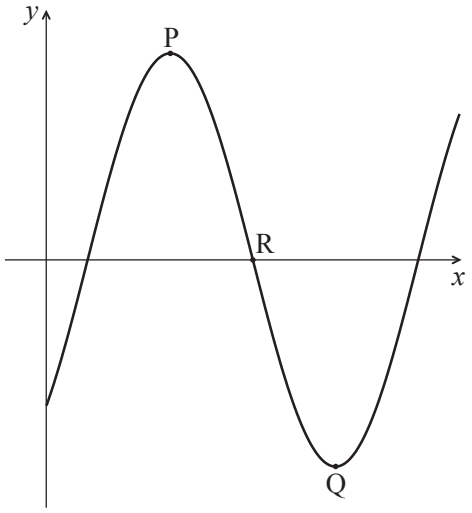
(c) (i) Sketch the graph of f.

(ii) Write down the root of $f(\theta) = 0$. *[4 marks]*

(d) Use the graph of f to find the values of θ for which $l < 1.3\,\text{PQ}$. *[3 marks]*

5. *[Maximum mark: 6]*

Let $f(x) = a\cos(b(x-c))$. The diagram below shows part of the graph of f, for $0 \le x \le 10$.



The graph has a local maximum at $P(3, 5)$, a local minimum at $Q(7, -5)$, and crosses the x-axis at R.

(a) Write down the value of

(i) a;

(ii) c. *[2 marks]*

(b) Find the value of b. *[2 marks]*

(c) Find the x-coordinate of R. *[2 marks]*

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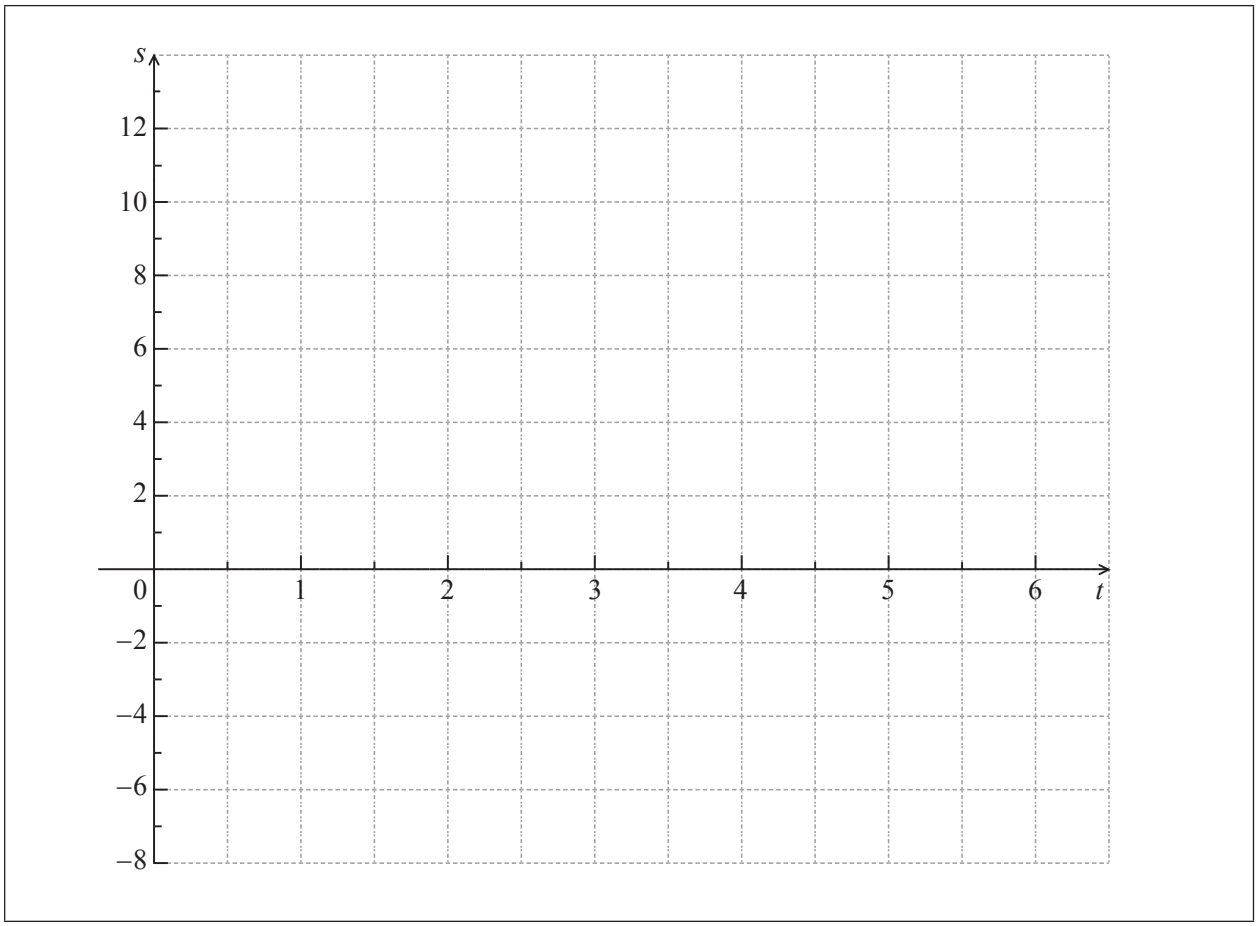
7. *[Maximum mark: 7]*

A particle's displacement, in metres, is given by $s(t) = 2t\cos t$, for $0 \le t \le 6$, where t is the time in seconds.

(a) On the grid below, sketch the graph of s. *[4 marks]*



(This question continues on the following page)

(Question 7 continued)

(b) Find the maximum velocity of the particle. *[3 marks]*

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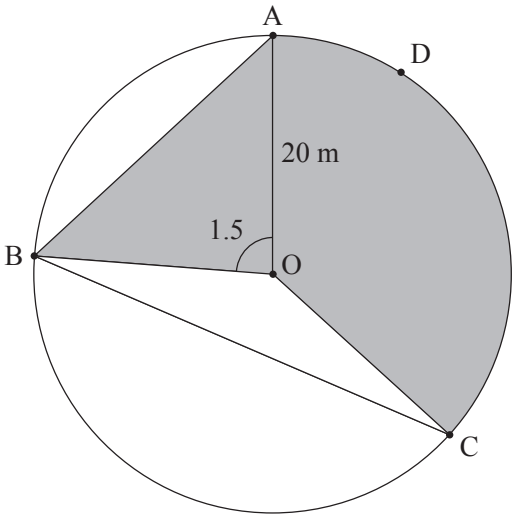
*Do **NOT** write solutions on this page.*

SECTION B

*Answer **all** questions on the answer sheets provided. Please start each question on a new page.*

8. *[Maximum mark: 15]*

The following diagram shows a circular play area for children.



The circle has centre O and a radius of 20 m, and the points A, B, C and D lie on the circle. Angle AOB is 1.5 radians.

(a) Find the length of the chord [AB]. *[3 marks]*

(b) Find the area of triangle AOB. *[2 marks]*

Angle BOC is 2.4 radians.

(c) Find the length of arc ADC. *[3 marks]*

(d) Find the area of the shaded region. *[3 marks]*

(e) The shaded region is to be painted red. Red paint is sold in cans which cost \$32 each. One can covers 140 m^2. How much does it cost to buy the paint? *[4 marks]*

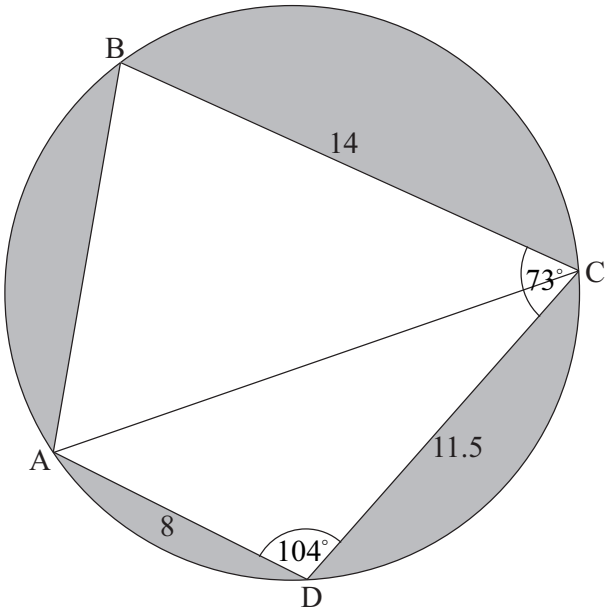
*Do **NOT** write solutions on this page.*

SECTION B

*Answer **all** questions in the answer booklet provided. Please start each question on a new page.*

8. *[Maximum mark: 14]*

The diagram shows a circle of radius 8 metres. The points ABCD lie on the circumference of the circle.



BC = 14 m, CD = 11.5 m, AD = 8 m, $A\hat{D}C = 104^\circ$, and $B\hat{C}D = 73^\circ$

(a) Find AC. *[3 marks]*

(b) (i) Find $A\hat{C}D$.

(ii) Hence, find $A\hat{C}B$. *[5 marks]*

(c) Find the area of triangle ADC. *[2 marks]*

(d) Hence or otherwise, find the total area of the shaded regions. *[4 marks]*

*Do **NOT** write solutions on this page.*

10. *[Maximum mark: 16]*

A Ferris wheel with diameter 122 metres rotates clockwise at a constant speed. The wheel completes 2.4 rotations every hour. The bottom of the wheel is 13 metres above the ground.

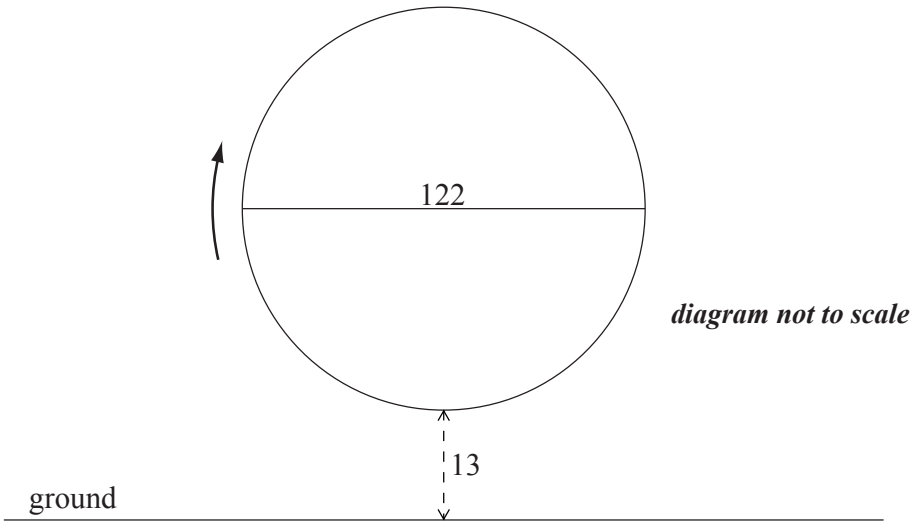


diagram not to scale

A seat starts at the bottom of the wheel.

(a) Find the maximum height above the ground of the seat. *[2 marks]*

After t minutes, the height h metres above the ground of the seat is given by

$$h = 74 + a\cos bt\ .$$

(b) (i) Show that the period of h is 25 minutes.

(ii) Write down the **exact** value of b. *[2 marks]*

(c) Find the value of a. *[3 marks]*

(d) Sketch the graph of h, for $0 \le t \le 50$. *[4 marks]*

(e) In one rotation of the wheel, find the probability that a randomly selected seat is at least 105 metres above the ground. *[5 marks]*

3. *[Maximum mark: 6]*

The following diagram shows a triangle ABC.

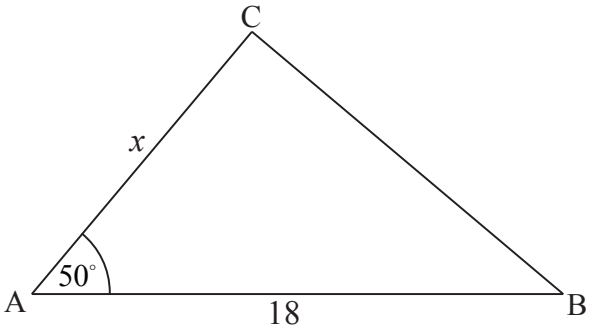


diagram not to scale

The area of triangle ABC is $80\ \text{cm}^2$, $\text{AB} = 18\ \text{cm}$, $\text{AC} = x\ \text{cm}$ and $\text{B}\hat{\text{A}}\text{C} = 50^\circ$.

(a) Find x. *[3 marks]*

(b) Find BC. *[3 marks]*

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7. *[Maximum mark: 8]*

The following diagram shows a circle with centre O and radius r cm.

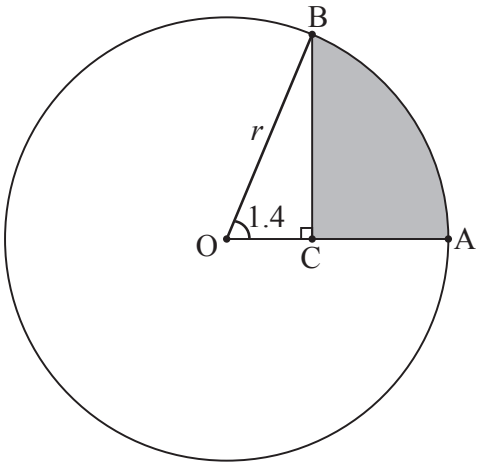

diagram not to scale

Points A and B are on the circumference of the circle and $\hat{AOB} = 1.4$ radians.
The point C is on [OA] such that $\hat{BCO} = \frac{\pi}{2}$ radians.

(a) Show that $OC = r\cos 1.4$. *[1 mark]*

(b) The area of the shaded region is $25\ \text{cm}^2$. Find the value of r. *[7 marks]*

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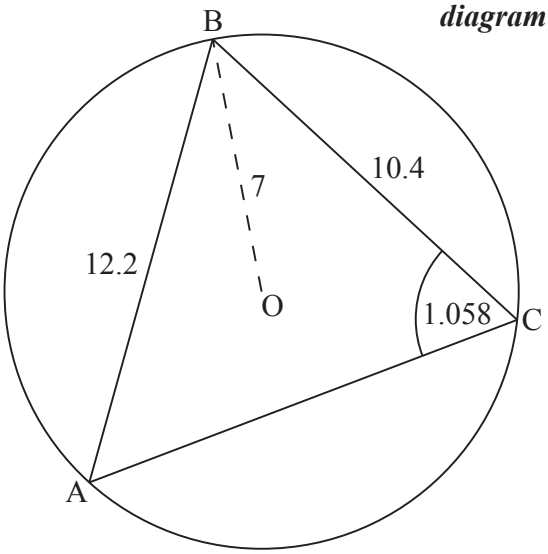
*Do **NOT** write solutions on this page.*

SECTION B

*Answer **all** questions in the answer booklet provided. Please start each question on a new page.*

8. *[Maximum mark: 14]*

Consider a circle with centre O and radius 7 cm. Triangle ABC is drawn such that its vertices are on the circumference of the circle.



$AB = 12.2\,\text{cm}$, $BC = 10.4\,\text{cm}$ and $A\hat{C}B = 1.058$ radians.

(a) Find $B\hat{A}C$. *[3]*

(b) Find AC. *[5]*

(c) Hence or otherwise, find the length of arc ABC. *[6]*

Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. In particular, solutions found from a graphic display calculator should be supported by suitable working, for example if graphs are used to find a solution, you should sketch these as part of your answer. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. You are therefore advised to show all working.

SECTION A

*Answer **all** questions in the boxes provided. Working may be continued below the lines if necessary.*

1. *[Maximum mark: 6]*

The following diagram shows triangle ABC.

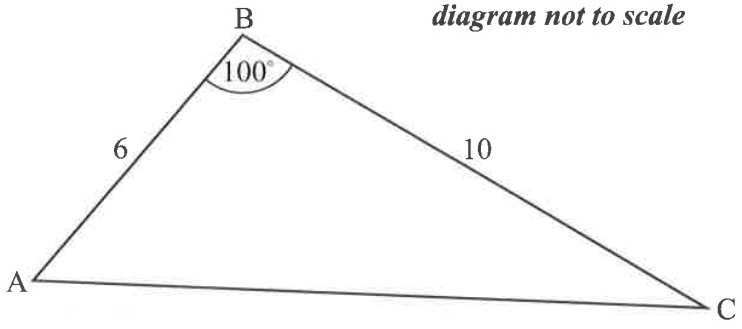


diagram not to scale

$AB = 6\,\text{cm}$, $BC = 10\,\text{cm}$, and $A\hat{B}C = 100^\circ$.

(a) Find AC. *[3]*

(b) Find $B\hat{C}A$. *[3]*

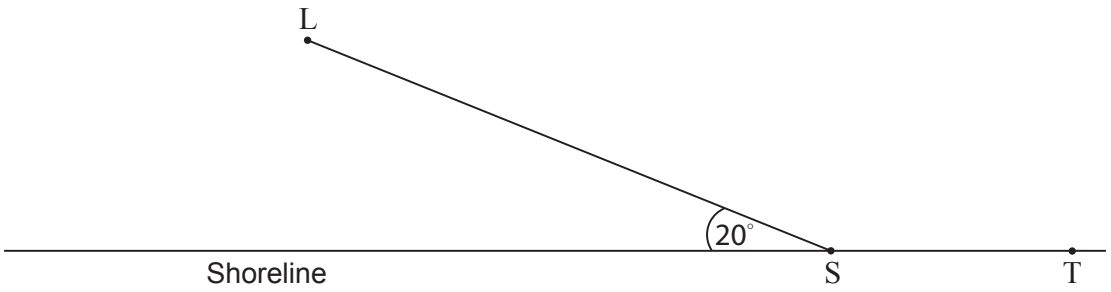
Do **not** write solutions on this page.

Section B

Answer **all** questions in the answer booklet provided. Please start each question on a new page.

8. [Maximum mark: 13]

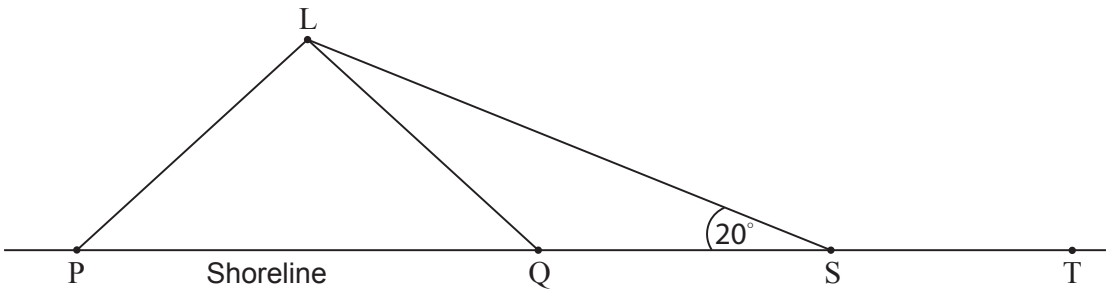
The following diagram shows a straight shoreline, with a supply store at S, a town at T, and an island L.



A boat delivers supplies to the island. The boat leaves S, and sails to the island. Its path makes an angle of 20° with the shoreline.

(a) The boat sails at $6\,\text{km}$ per hour, and arrives at L after 1.5 hours. Find the distance from S to L. [2]

It is decided to change the position of the supply store, so that its distance from L is $5\,\text{km}$. The following diagram shows the two possible locations P and Q for the supply store.



(b) Find the size of $\text{S}\hat{\text{P}}\text{L}$ and of $\text{S}\hat{\text{Q}}\text{L}$. [5]

(c) The town wants the new supply store to be as near as possible to the town.

(i) State which of the points P or Q is chosen for the new supply store.

(ii) Hence find the distance between the old supply store and the new one. [6]

Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. In particular, solutions found from a graphic display calculator should be supported by suitable working, for example if graphs are used to find a solution, you should sketch these as part of your answer. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. You are therefore advised to show all working.

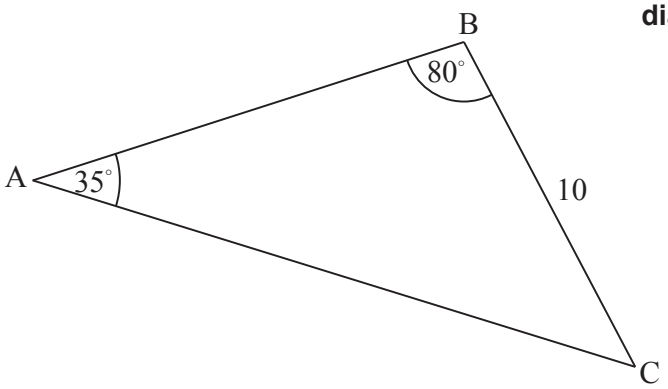
Section A

Answer **all** questions in the boxes provided. Working may be continued below the lines if necessary.

1. [Maximum mark: 6]

The following diagram shows triangle ABC.

diagram not to scale



$BC = 10\,\text{cm}$, $A\hat{B}C = 80^\circ$ and $B\hat{A}C = 35^\circ$.

(a) Find AC. [3]

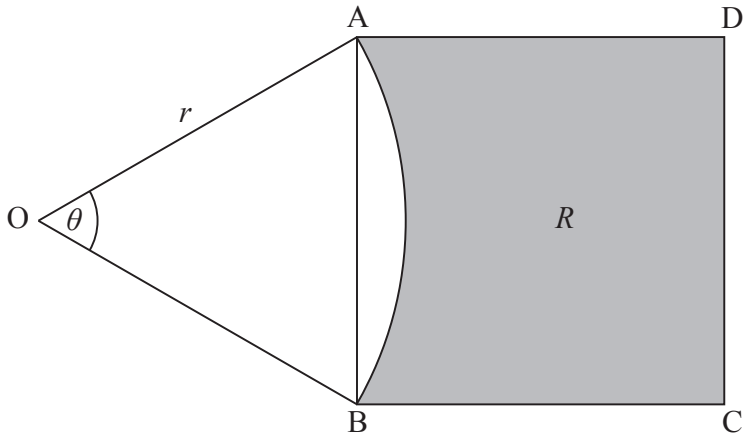
(b) Find the area of triangle ABC. [3]

(This question continues on the following page)

Do **not** write solutions on this page.

10. [Maximum mark: 16]

The following diagram shows a square ABCD, and a sector OAB of a circle centre O, radius r. Part of the square is shaded and labelled R.



$\hat{AOB} = \theta$, where $0.5 \leq \theta < \pi$.

(a) Show that the area of the square ABCD is $2r^2(1-\cos\theta)$. [4]

(b) When $\theta = \alpha$, the area of the square ABCD is equal to the area of the sector OAB.

(i) Write down the area of the sector when $\theta = \alpha$.

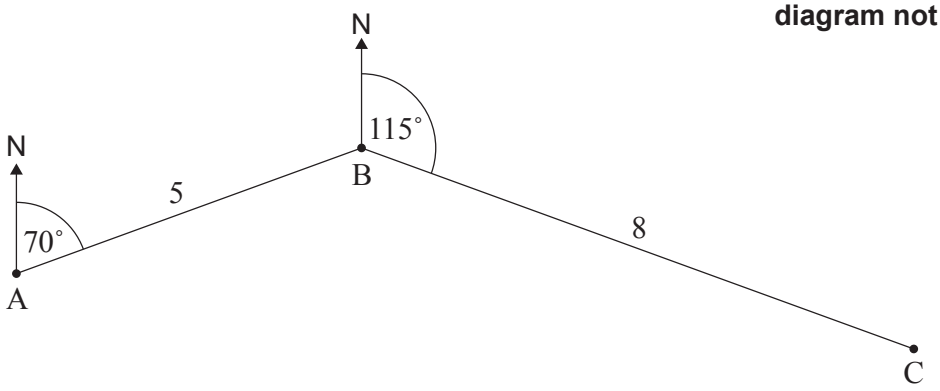
(ii) Hence find α. [4]

(c) When $\theta = \beta$, the area of R is more than twice the area of the sector.
Find all possible values of β. [8]

3. [Maximum mark: 7]

The following diagram shows three towns A, B and C. Town B is $5\,\text{km}$ from Town A, on a bearing of 070°. Town C is $8\,\text{km}$ from Town B, on a bearing of 115°.

diagram not to scale



(a) Find $\text{A}\hat{\text{B}}\text{C}$. [2]

(b) Find the distance from Town A to Town C. [3]

(c) Use the sine rule to find $\text{A}\hat{\text{C}}\text{B}$. [2]

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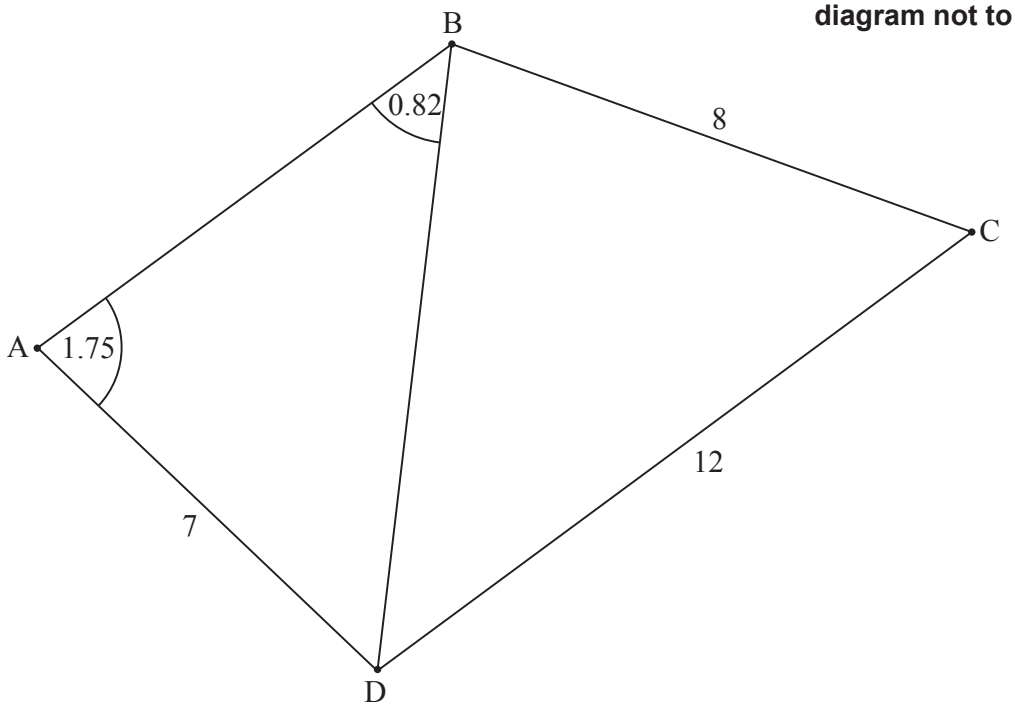
2. [Maximum mark: 6]

The following diagram shows a quadrilateral ABCD.

diagram not to scale



$AD = 7\,\text{cm}$, $BC = 8\,\text{cm}$, $CD = 12\,\text{cm}$, $D\hat{A}B = 1.75$ radians, $A\hat{B}D = 0.82$ radians.

(a) Find BD. [3]

(b) Find $D\hat{B}C$. [3]

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4. [Maximum mark: 8]

The height, h metres, of a seat on a Ferris wheel after t minutes is given by

$$h(t) = -15\cos 1.2t + 17, \text{ for } t \geq 0.$$

(a) Find the height of the seat when $t = 0$. [2]

(b) The seat first reaches a height of $20\,\text{m}$ after k minutes. Find k. [3]

(c) Calculate the time needed for the seat to complete a full rotation, giving your answer correct to one decimal place. [3]

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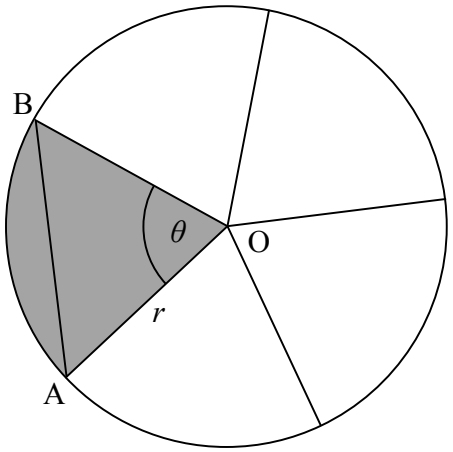
3. [Maximum mark: 7]

The following diagram shows a circle, centre O and radius r mm. The circle is divided into five equal sectors.

diagram not to scale



One sector is OAB, and $\hat{AOB} = \theta$.

(a) Write down the **exact** value of θ in radians. [1]

The area of sector AOB is $20\pi \text{ mm}^2$.

(b) Find the value of r. [3]

(c) Find AB. [3]

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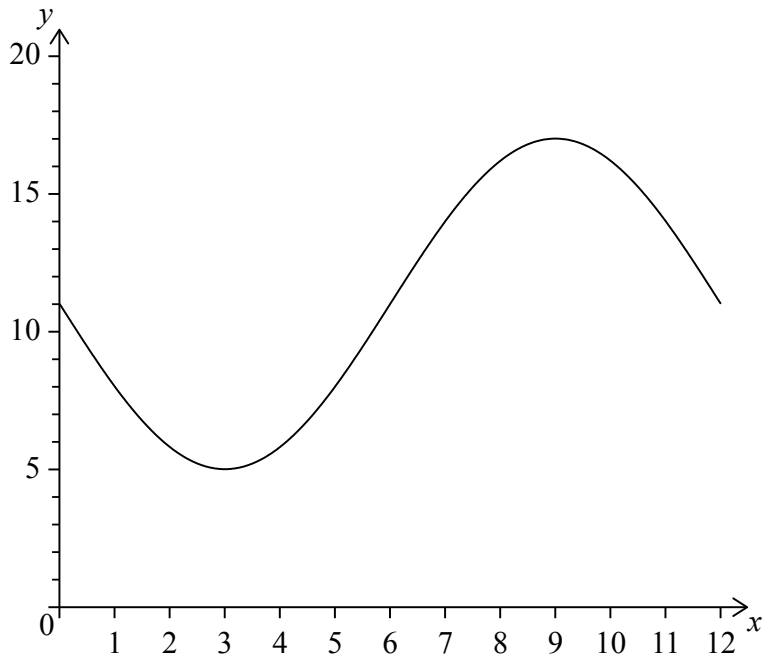
Do **not** write solutions on this page.

10. [Maximum mark: 15]

The following diagram shows the graph of $f(x) = a\sin bx + c$, for $0 \le x \le 12$.



The graph of f has a minimum point at $(3, 5)$ and a maximum point at $(9, 17)$.

(a) (i) Find the value of c.

(ii) Show that $b = \frac{\pi}{6}$.

(iii) Find the value of a. [6]

The graph of g is obtained from the graph of f by a translation of $\begin{pmatrix} k \\ 0 \end{pmatrix}$. The maximum point on the graph of g has coordinates $(11.5, 17)$.

(b) (i) Write down the value of k.

(ii) Find $g(x)$. [3]

The graph of g changes from concave-up to concave-down when $x = w$.

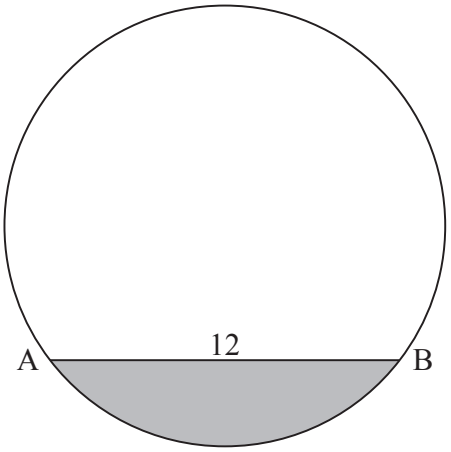
(c) (i) Find w.

(ii) Hence or otherwise, find the maximum positive rate of change of g. [6]

5. [Maximum mark: 7]

The following diagram shows the chord [AB] in a circle of radius $8\,\text{cm}$, where $\text{AB} = 12\,\text{cm}$.

diagram not to scale



Find the area of the shaded segment.

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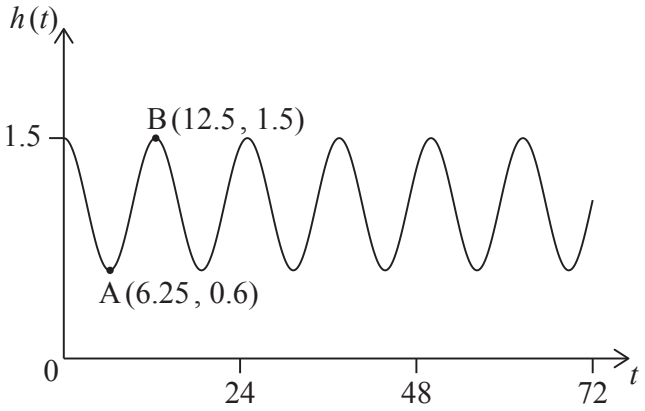
Do **not** write solutions on this page.

Section B

Answer **all** questions in the answer booklet provided. Please start each question on a new page.

8. [Maximum mark: 14]

At Grande Anse Beach the height of the water in metres is modelled by the function $h(t) = p\cos(q \times t) + r$, where t is the number of hours after $21{:}00$ hours on 10 December 2017. The following diagram shows the graph of h, for $0 \le t \le 72$.



The point $\mathrm{A}(6.25, 0.6)$ represents the first low tide and $\mathrm{B}(12.5, 1.5)$ represents the next high tide.

(a) (i) How much time is there between the first low tide and the next high tide?

(ii) Find the difference in height between low tide and high tide. [4]

(b) Find the value of

(i) p;

(ii) q;

(iii) r. [7]

(c) There are two high tides on 12 December 2017. At what time does the second high tide occur? [3]

Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. In particular, solutions found from a graphic display calculator should be supported by suitable working, for example if graphs are used to find a solution, you should sketch these as part of your answer. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. You are therefore advised to show all working.

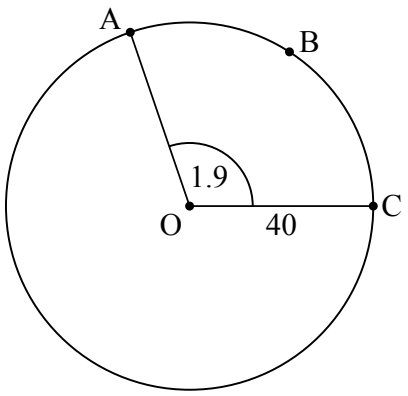
Section A

Answer **all** questions. Answers must be written within the answer boxes provided. Working may be continued below the lines if necessary.

1. [Maximum mark: 6]

The following diagram shows a circle with centre O and radius $40\,\text{cm}$.

diagram not to scale



The points A, B and C are on the circumference of the circle and $A\hat{O}C = 1.9$ radians.

(a) Find the length of arc ABC. [2]

(b) Find the perimeter of sector $OABC$. [2]

(c) Find the area of sector $OABC$. [2]

(This question continues on the following page)

4. [Maximum mark: 6]

The depth of water in a port is modelled by the function $d(t) = p\cos qt + 7.5$, for $0 \le t \le 12$, where t is the number of hours after high tide.

At high tide, the depth is 9.7 metres.

At low tide, which is 7 hours later, the depth is 5.3 metres.

(a) Find the value of p. [2]

(b) Find the value of q. [2]

(c) Use the model to find the depth of the water 10 hours after high tide. [2]

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