



Mathematics

National 5 Practice Paper C

Paper 1

Duration - 1 hour

Total marks - 40

- You may NOT use a calculator
- Attempt all the questions.
- Use **blue** or **black** ink.
- Full credit will only be given to solutions which contain appropriate working.
- State the units for your answer where appropriate.

FORMULAE LIST

The roots of are

$$ax^2 + bx + c = 0 \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Sine rule:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Cosine rule:

$$a^2 = b^2 + c^2 - 2bc \cos A \quad \text{or} \quad \cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

Area of a triangle:

$$A = \frac{1}{2}ab \sin C$$

Volume of a Sphere:

$$V = \frac{4}{3}\pi r^3$$

Volume of a cone:

$$V = \frac{1}{3}\pi r^2 h$$

Volume of a pyramid:

$$V = \frac{1}{3}Ah$$

Standard deviation:

$$s = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}} = \sqrt{\frac{\sum x^2 - (\sum x)^2/n}{n-1}}, \text{ where } n \text{ is the sample size.}$$

1. Evaluate $5.04 + 8.4 \div 7$. 2
2. Evaluate $\frac{2}{7}\left(1\frac{3}{4} + \frac{3}{8}\right)$. 2
3. Simplify $3(2x - 4) - 4(3x + 1)$ 3
4. $f(x) = 7 - 4x$
- (a) Evaluate $f(-2)$. 1
- (b) Given that $f(t) = 9$, find t . 2
5. Solve, by factorising $7 + 6x - x^2 = 0$. 3

6. A hotel books taxis from a company called Quick-Cars.
The receptionist notes the waiting time for every taxi ordered over a period of two weeks. These times, in minutes, are shown below.

| | | | | | | |
|----|----|----|----|----|----|----|
| 12 | 25 | 29 | 37 | 6 | 13 | 26 |
| 32 | 42 | 7 | 14 | 29 | 35 | 44 |

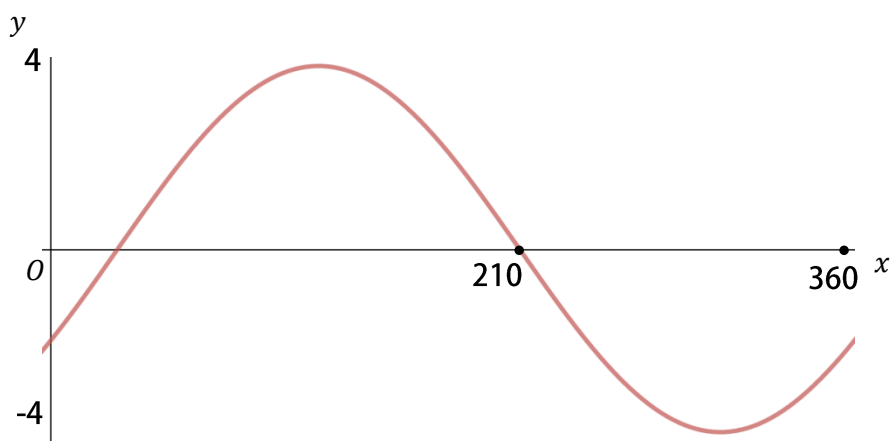
- (a) For the given data, calculate:
- (i) the median 1
 - (ii) the lower quartile 1
 - (iii) the upper quartile 1
- (b) Calculate the interquartile range. 1

In another two week period, the hotel books taxis from a company called Fast-Cabs.

The median waiting time for Fast-Cabs is found to be 27.5 minutes and the interquartile range for Fast-Cabs is found to be 5 minutes.

- (c) Use this information to compare the two companies. 2

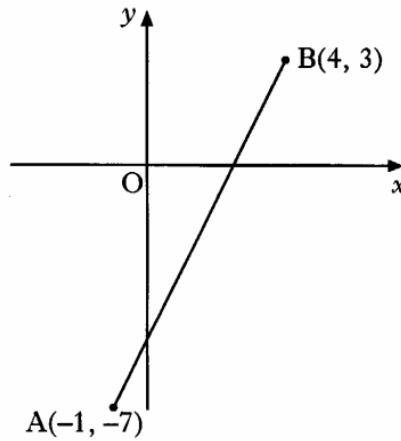
7. Part of the graph of $y = a\sin(x + b)^\circ$ is shown in the diagram.



State the values of a and b .

2

8. In the diagram below, A is the point $(-1, -7)$ and B is the point $(4, 3)$.



- (a) Find the gradient of the line AB. 1
- (b) AB cuts the y -axis at the point $(0, -5)$.
Write down the equation of the line AB. 2
- (c) The point $(3k, k)$ lies on AB. Find the value of k . 2

9.
$$f(x) = x^2 + 6x - 7$$

- (a) Write $f(x)$ in the form $(x + a)^2 + b$. 2
- (b) State the coordinates of the turning point of $f(x)$. 1

10. Andrew and Daisy each book in at the Sleepwell Lodge.
- (a) Andrew stays for 3 nights and has breakfast on 2 mornings.
His bill is £145.
Write down an algebraic equation to illustrate this information. 1
- (b) Daisy stays for 5 nights and has breakfast on 3 mornings.
Her bill is £240.
Write down an algebraic equation to illustrate this information. 1
- (c) Find the cost of one breakfast 3
-
11. (a) Evaluate $8^{\frac{2}{3}}$ 2
- (b) Simplify $\frac{\sqrt{24}}{\sqrt{2}}$ 2
- (c) Simplify $\frac{2x + 2}{(x + 1)^2}$ 2

[End of question paper]



Mathematics

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Paper 2

Duration - 1 hour and 30 minutes

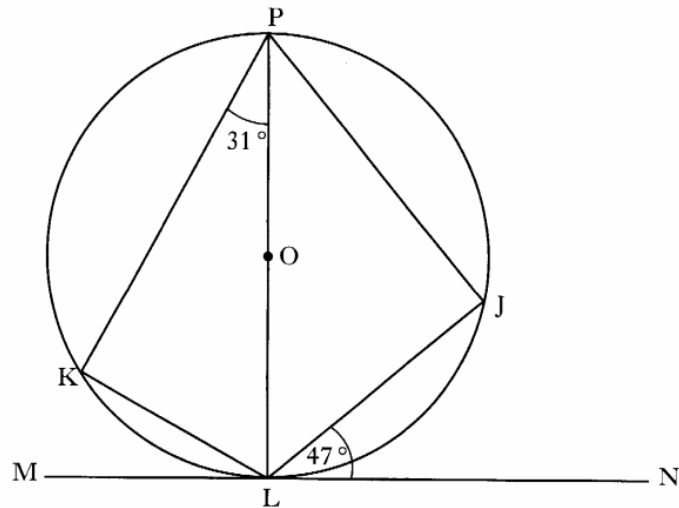
Total marks - 50

- You may use a calculator
- Attempt all the questions.
- Use **blue** or **black** ink.
- Full credit will only be given to solutions which contain appropriate working.
- State the units for your answer where appropriate.

1. Bacteria in a test-tube increase at the rate of 0.6% per hour.
 At 12 noon, there are 5000 bacteria.
 At 3 pm, how many bacteria will be present?
 Give your answer correct to 3 significant figures.

4

2.



The tangent, MN, touches the circle, centre O, at L.
 Angle JLN = 47°
 Angle KPL = 31°

Find the size of angle KLJ.

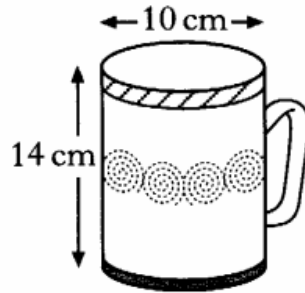
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3. Change the subject of the formula

$$y = ax^2 + c \quad \text{to } x.$$

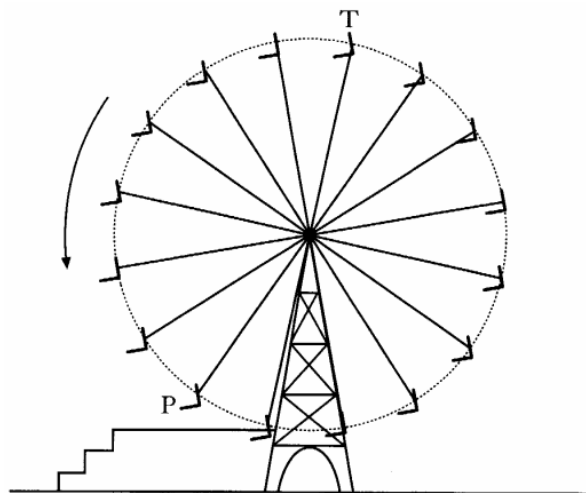
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4. A mug is in the shape of a cylinder with diameter 10 centimetres and height 14 centimetres.



- (a) Calculate the volume of the mug. 2
- (b) 600 millilitres of coffee are poured in.
Calculate the depth of the coffee in the mug. 3

5. The diagram below shows a big wheel at the fairground.



The wheel has 16 chairs equally spaced on its circumference.
The radius of the wheel is 9 metres.

As the wheel rotates in an anticlockwise direction, find the distance a chair travels in moving from position T to position P in the diagram.

4

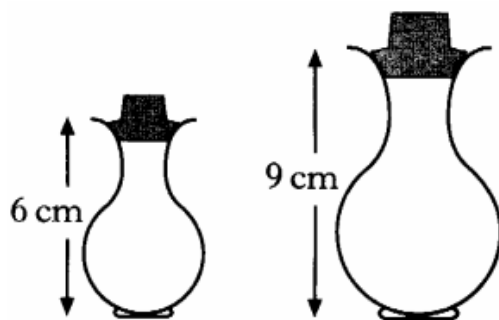
6. Find the roots of the equation

$$2x^2 + 4x - 9 = 0,$$

Give your answers correct to one decimal place.

4

7. Two perfume bottles are mathematically similar in shape.



The smaller one is 6 centimetres high and holds 30 millilitres of perfume.
The larger one is 9 centimetres high.

What volume of perfume will the larger one hold?

3

9. Determine the nature of the roots of the equation

$$(x - 2)^2 - 5 = 0.$$

4

10. A sheep shelter is part of a cylinder as shown in figure 1.
It is 6 metres wide and 2 metres high.

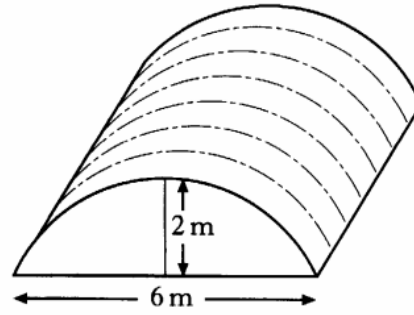


Figure 1

The cross-section of the shelter is a segment of a circle with centre O, as shown in figure 2.

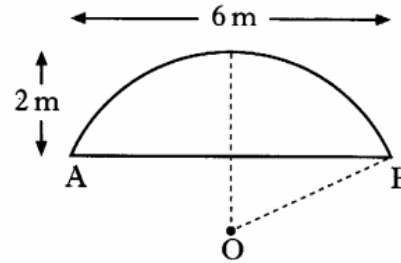
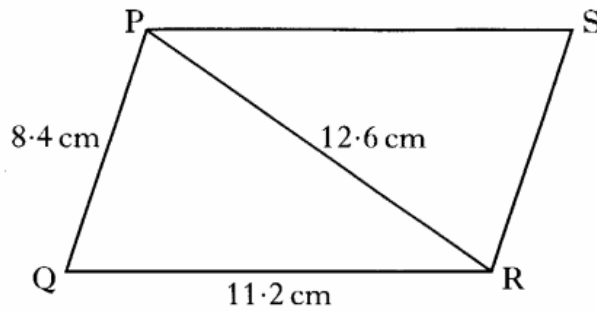


Figure 2

OB is the radius of the circle.
Calculate the length of OB.

4

11. The sketch shows a parallelogram, PQRS.



- (a) Calculate the size of angle PQR. Do not use a scale drawing. 3
- (b) Calculate the area of the parallelogram. 3

12. (a) Solve the equation

$$2 \tan x^\circ + 7 = 0, \quad 0 \leq x \leq 360.$$

3

(b) Prove that

$$\sin^3 x + \sin x \cos^2 x = \sin x.$$

2

13. (a) A driver travels from A to B, a distance of x miles, at a constant speed of 75 kilometres per hour.

Find the time taken for this journey in terms of x .

1

(b) The time taken for the journey from B to A is $\frac{x}{50}$ hours.

Calculate the average speed for the whole journey.

4

[End of question paper]