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National 5 Maths 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 $ax^2 + bx + c = 0 \quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A \quad \text{or} \quad \cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

Area of a triangle: $A = \dfrac{1}{2}ab\sin C$

Volume of a Sphere: $V = \dfrac{4}{3}\pi r^3$

Volume of a cone: $V = \dfrac{1}{3}\pi r^2 h$

Volume of a pyramid: $V = \dfrac{1}{3}Ah$

Standard deviation: $s = \sqrt{\dfrac{\sum(x-\bar{x})^2}{n-1}} = \sqrt{\dfrac{\sum x^2 - (\sum x)^2/n}{n-1}}$, where n 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

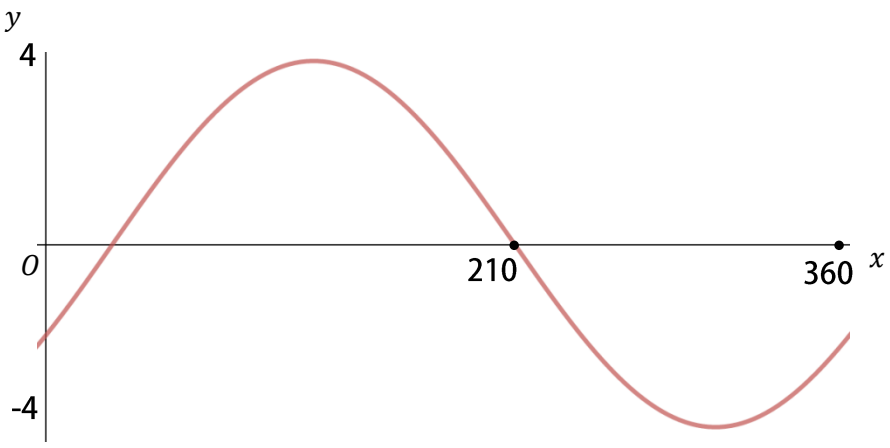
(b) Calculate the interquartile range. 1

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.

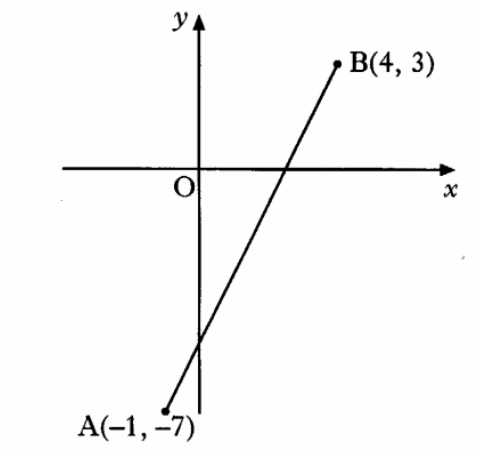
(c) Use this information to compare the two companies. 2

7. Part of the graph of $y = a\sin(x + b)°$ 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]

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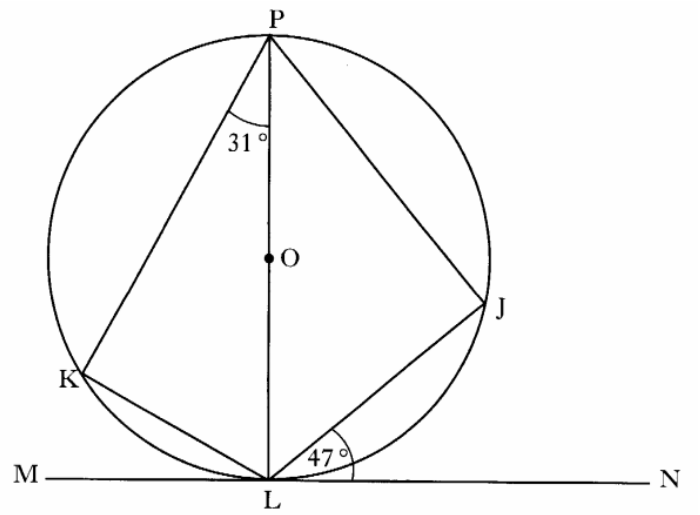
Paper 2

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 4.6% per hour.
At 12 noon, there are 50 000 bacteria.
At 5 pm, how many bacteria will be present?
Give your answer correct to 3 significant figures. 4

2. 

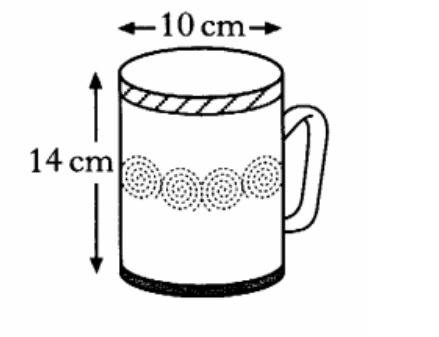
The tangent, MN, touches the circle, centre O, at L.
Angle JLN = 47°
Angle KPL = 31°

Find the size of angle JLK. 3

3. Change the subject of the formula

$y = ax^3 + c$ to x. 3

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

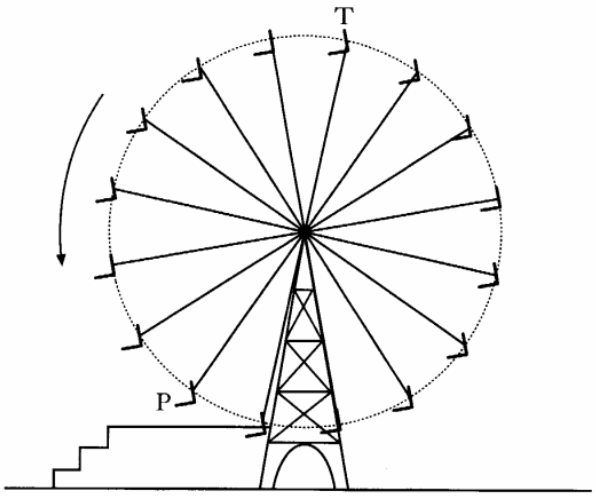


(a) Calculate the capacity of the mug. 2

(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.

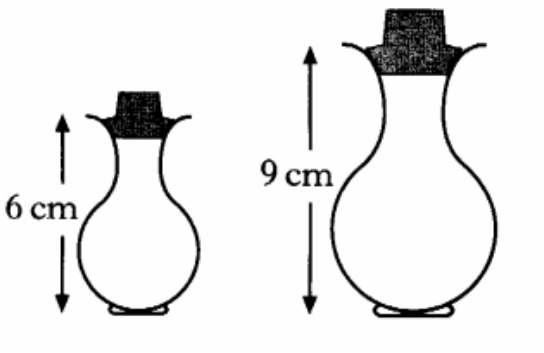
As the wheel rotates in an anticlockwise direction, find the distance a chair travels in moving from position T to position P in the diagram. 4

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

8. Determine the nature of the roots of the equation

$$(x - 2)^2 - 5x = 0.$$ 4

9. A pony shelter is part of a cylinder as shown in figure 1.

It is 6 metres wide and 2 metres high.

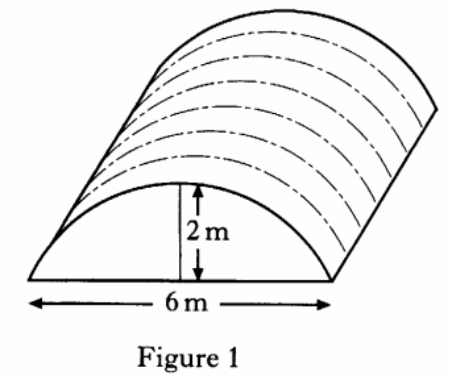


Figure 1

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

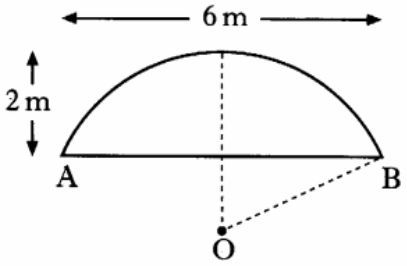
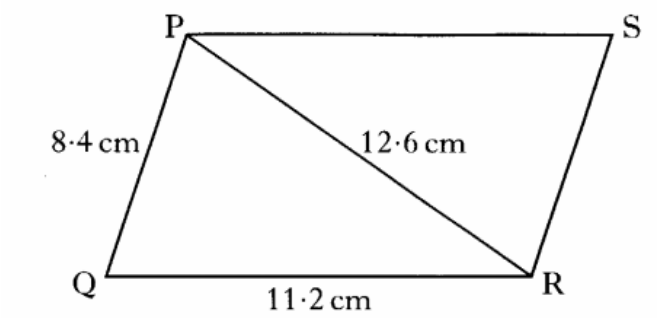


Figure 2

OB is the radius of the circle.

Calculate the length of OB. 4

10. The diagram 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

11. (a) Solve the equation

$$2\tan x° + 7 = 0, \qquad 0 \leq x \leq 360.$$ 3

(b) Prove that

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

12. (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]