N5

Mαthematics

National 5 Practice Paper A

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

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

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

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

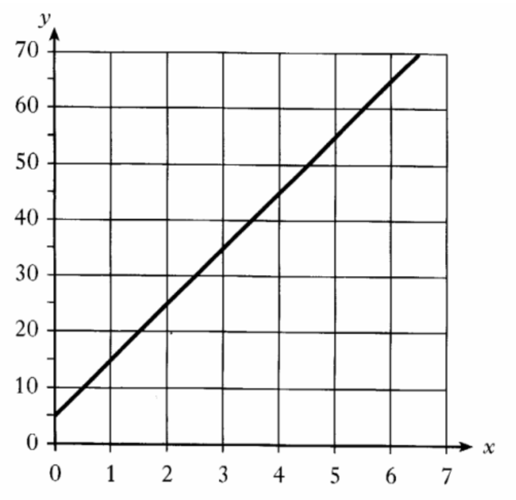
Volume of a pyramid: $V = \dfrac{1}{3}Ah$

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 $3\frac{2}{5} - 1\frac{3}{4}$ 2

2. Factorise $x^2 + 2x - 15.$ 2

3.



Find the equation of this straight line in the form $y = mx + c$ 3

4. Express $y = x^2 + 8x - 7$ in the form $y = (x + a)^2 + b$ and hence state the coordinates of the turning point. 3

5. $P = R^3b - 5$

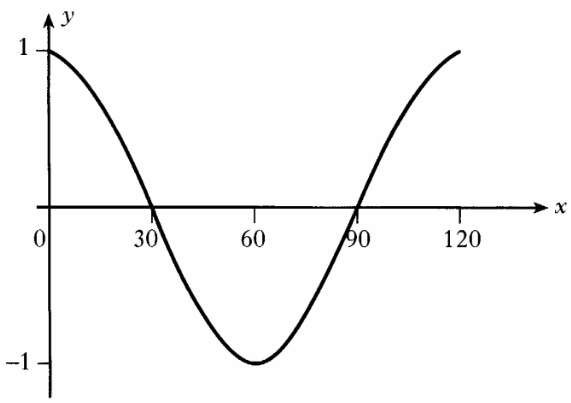
Change the subject of the formula to R. 3

6. Two vectors are defined as $\boldsymbol{u} = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$ and $\boldsymbol{v} = \begin{pmatrix} -4 \\ 3 \end{pmatrix}$.

(a) Find the resultant vector $\boldsymbol{u} + 3\boldsymbol{v}$. **1**

(b) Find $|\boldsymbol{u} + 3\boldsymbol{v}|$. 2

7.



Part of the graph of $y = \cos bx°$ is shown in the diagram.

State the value of b. 1

8. Find the point of intersection of the straight lines with equations

$2x + y = 5$ and $x - 3y = 6$. 4

9. A parabola has equation $y = x^2 - 3x + 7$.

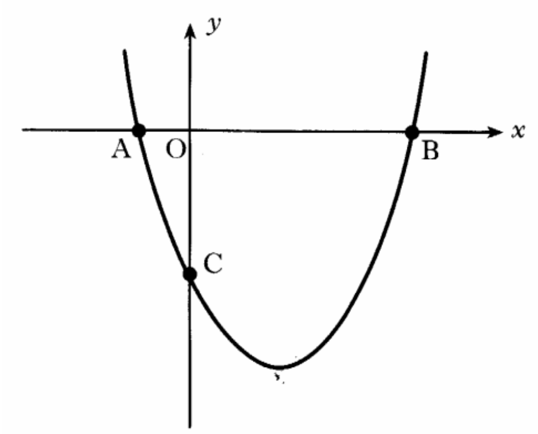
Using the discriminant, determine the nature of its roots. 3

10. A straight line has the equation $3x - y = 9$.

A second line is parallel to this and passes throught the point $(5, -3)$.

Write down the equation of the second line. 3

11.



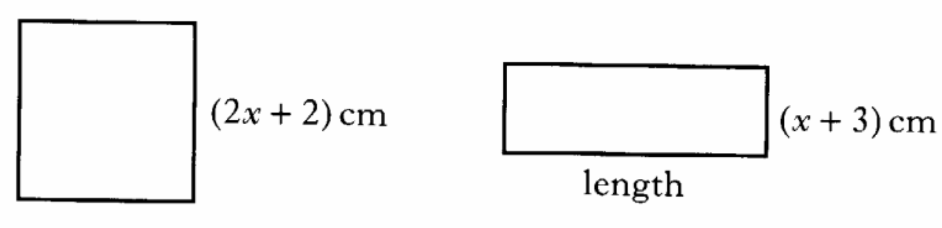
The equation of the parabola in the diagram above is $y = (x-2)^2 - 9$.

(a) State the coordinates of the minimum turning point of the parabola. 2

(b) Find the coordinates of C. 2

(c) A is the point $(-1, 0)$. State the coordinates of B. 1

12. The square and rectangle shown below have the same perimeter.



Show that the length of the rectangle is $(3x+1)$ centimetres. 2

13. (a) Express $\frac{3}{x} - \frac{5}{x+2}$, $x \neq 0, x \neq 2$, as a single fraction in its simplest form. 3

(b) Express $\sqrt{18} - \sqrt{2} + \sqrt{72}$ as a surd in its simplest form. 3

[End of question paper]

N5

Mαthematics

National 5 Practice Paper A

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. The population of a city is increasing at a steady rate of 2.4% per annum. The current population is 528 000.

What is the expected population in 4 years?

Give your answer to the nearest thousand. 3

2. Two groups of 6 students are given the same test.

(a) The marks of Group A are:

73 47 59 71 48 62.

Use an appropriate formula to calculate the mean and the standard deviation.

Show clearly all your working. 4

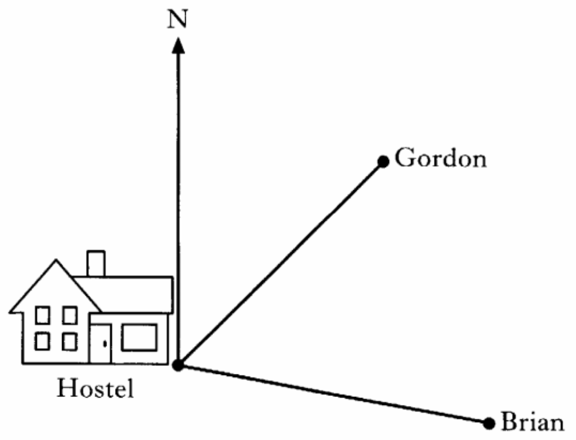
(b) In Group B, the mean is 60 and the standard deviation is 29.8.

Compare the results of the two groups. 2

3. Multiply out the brackets and collect like terms.

$$(x+4)(2x^2+3x-1)$$ 3

4. Gordon and Brian leave a hostel at the same time.
Gordon walks on a bearing of 045° at a speed of 4.4 kilometres per hour.
Brian walks on a bearing of 100° at a speed of 4.8 kilometres per hour.



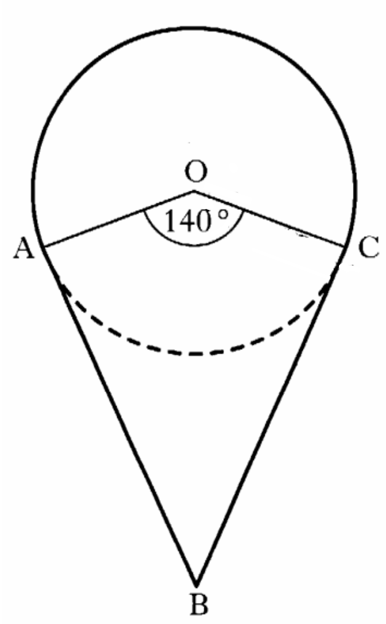
If they both walk at stead speeds, how far apart will they be after 2 hours? 5

5. The diagram shows a mirror which has been designed for a new hotel.

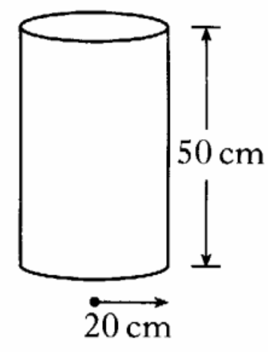
The shape consists of a sector of a circle and a kite AOCB.

- The circle, centre O, has a radius of 50 centimetres.
- Angle AOC = 140°
- AB and CB are tangents to the circle at A and C respectively.

Find the perimeter of the mirror. 5

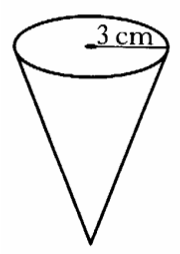


6. A drinks container is in the shape of a cylinder with radius 20 centimetres and height 50 centimetres.



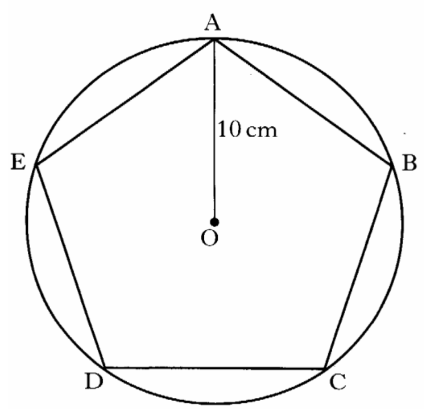
(a) Calculate the volume of the drinks container.
Give your answer in cubic centimetres, correct to two significant figures. 3

(b) Liquid from the full container can fill 800 cups, in the shape of cones, each of radius 3 centimetres.



What will be the height of liquid in each cup? 4

7.



A regular pentagon ABCDE is drawn in a circle, centre O, with radius 10 centimetres.

Calculate the area of the regular pentagon. 5

8. (a) Express $a^2\left(2a^{-\frac{1}{2}}+a\right)$ in its simplest form. 2

(b) Use an appropriate formula to solve the quadratic equation

$$3x^2+3x-7=0.$$

Give your answers correct to 1 decimal place. 4

9. (a) Solve the equation

$$4\tan x° + 5 = 0, \qquad 0 \leq x \leq 360.$$ 3

(b) Show that

$$\tan x \cos x = \sin x.$$ 2

10. A rectangular wall vent is 30 centimetres long and 10 centimetres wide.

It is to be enlarged by increasing both the length and the width by x centimetres.

(a) Show that the area, A square centimetres, of the new vent is given by

$$A = x^2 + 40x + 300.$$

The area of the new vent must be at least 75% more than the original area.

(b) Find the minimum dimensions of the new vent. 5

[End of question paper]