

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

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

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

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

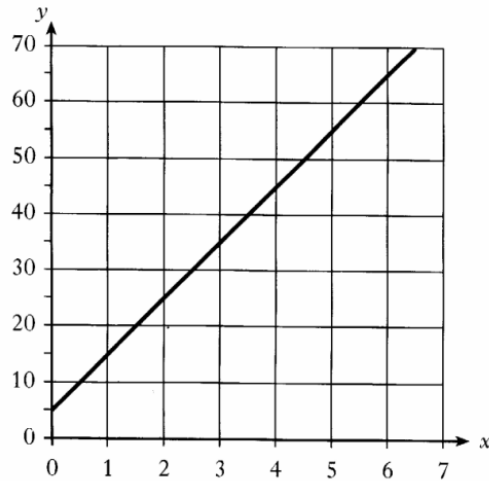
Volume of a pyramid:  $V = \frac{1}{3}Ah$

Standard deviation:  $s = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}} = \sqrt{\frac{\sum x^2 - (\sum x)^2/n}{n-1}}$ , 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  $\mathbf{u} = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$  and  $\mathbf{v} = \begin{pmatrix} -4 \\ 3 \end{pmatrix}$ .

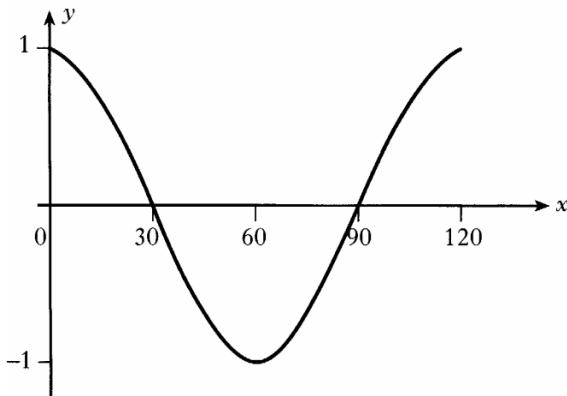
(a) Find the resultant vector  $\mathbf{u} + 3\mathbf{v}$ .

1

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

2

7.



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

State the value of  $b$ .

1

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

$$2x + y = 5 \quad \text{and} \quad x - 3y = 6.$$

4

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

Using the discriminant, determine the nature of its roots.

3

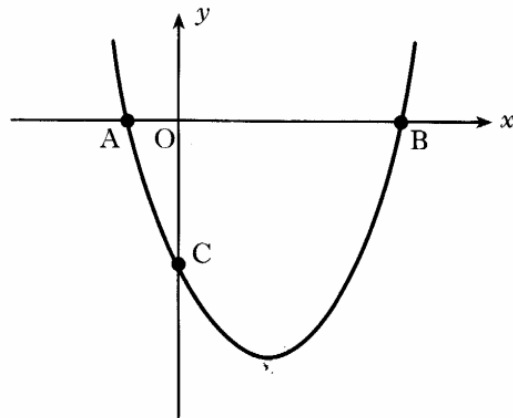
10. A straight line has the equation  $3x - y = 9$ .

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

Write down the equation of the second line.

3

11.



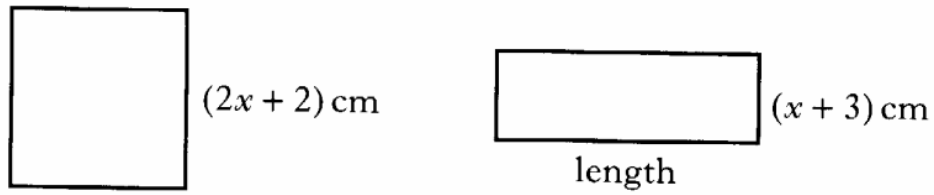
The equation of the parabola in the diagram above is  $y = (x - 2)^2 - 9$ .

(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]

## National 5 Maths 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

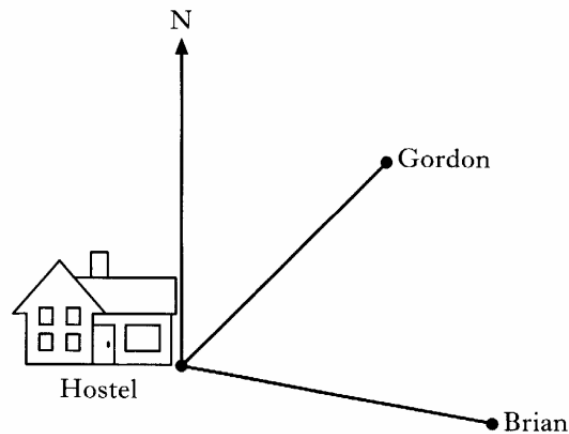
3. Multiply out the brackets and collect like terms.

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

3



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



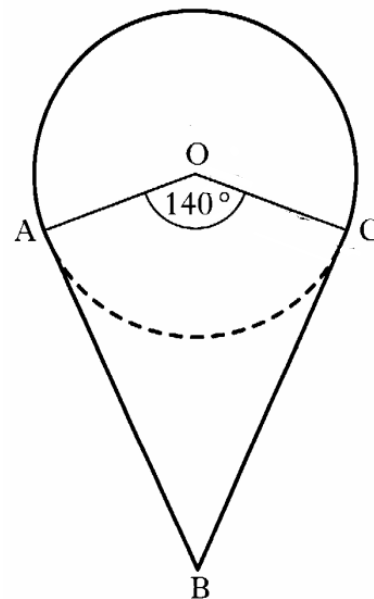
If they both walk at steady speeds, how far apart will they be after 2 hours?

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 =  $140^\circ$
- AB and CB are tangents to the circle at A and C respectively.

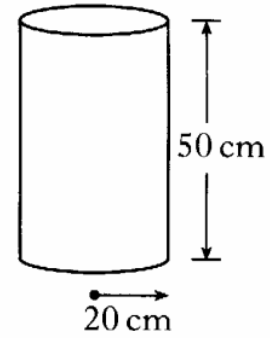


Find the perimeter of the mirror.

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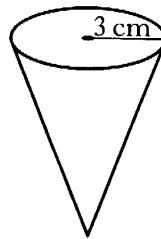
6. A drinks container is in the shape of a cylinder with radius 20 centimetres and height 50 centimetres.

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



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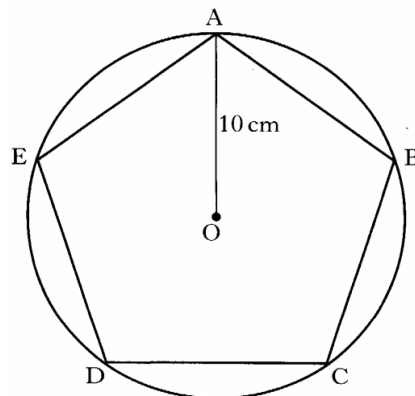
- (b) Liquid from the full container can fill 800 cups, in the shape of cones, each of radius 3 centimetres.



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

$$4 \tan x^\circ + 5 = 0, \quad 0 \leq x \leq 360. \quad 3$$

(b) Show that

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

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]