X056/201

MATHEMATICS
INTERMEDIATE 2
Units 1, 2 and 3
Paper 1
(Non-calculator)

Read carefully

1 You may **NOT** use a calculator.

2 Full credit will be given only where the solution contains appropriate working.

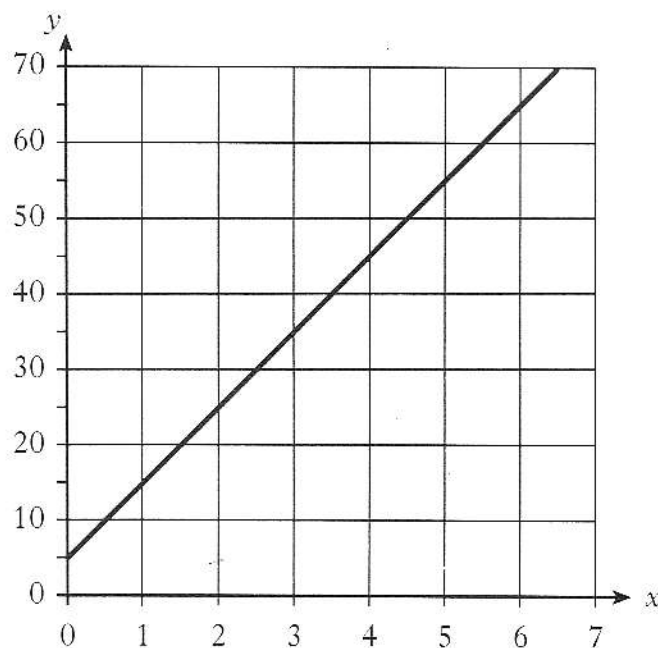3 Square-ruled paper is provided.

ALL questions should be attempted.

1. Factorise

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

2.

Find the equation of the straight line.   3

3. Find the point of intersection of the straight lines with equations $2x + y = 5$ and $x - 3y = 6$.   4

4. $$P = R^2 b - 5$$

Change the subject of the formula to R.   3

[Turn over

5.   The stem and leaf diagram shows the amounts of money spent by customers in a shop.
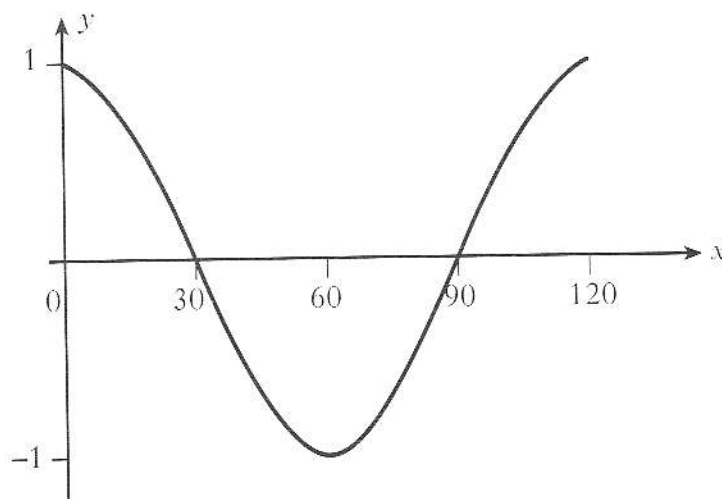
$$
\begin{array}{r|llllllll}
2 & 1 & 4 & 4 \\
3 & 0 & 1 & 5 & 5 & 8 \\
+ & 1 & 2 & 3 & 5 & 6 & 9 \\
5 & 0 & 1 & 2 & 3 & 5 & 8 & 9 & 9 \\
6 & 0 & 0 & 1 & 2 & 6 \\
7 & 1 & 2 & 2 \\
8 & 0 & 4 & 6
\end{array}
$$

   $n = 33$ 2|1 represents 21 pence

(a) Using the above information, find

 (i)   the median   **1**

 (ii) the lower quartile and the upper quartile **2**

 (iii) the semi-interquartile range.   **2**

(b) What is the probability that a customer chosen at random spent more than 80 pence? **1**
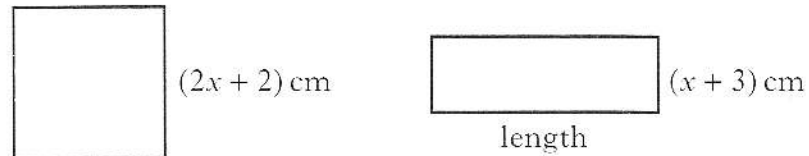
6.

   Part of the graph of $y = \cos bx^\circ$ is shown in the diagram.
   State the value of b.   **1**

7. The square and rectangle shown below have the same **perimeter**.

$(2x + 2)$ cm $(x + 3)$ cm

length

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

8. (*a*) Express $\dfrac{3}{x} - \dfrac{5}{x+2}$, $x \neq 0$, $x \neq -2$, 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]

X056/203

MATHEMATICS
INTERMEDIATE 2
Units 1, 2 and 3
Paper 2

Read carefully

1 **Calculators may be used in this paper.**

2 Full credit will be given only where the solution contains appropriate working.

3 Square-ruled paper is provided.

ALL questions should be attempted.

1. The population of a city is increasing at a steady rate of 2·4% per annum. The present population is 528 000.

    What is the expected population in 4 years time?

    Give your answer to the nearest thousand.

    3

2. Two groups of six 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. The contents of twenty matchboxes were counted.

    44   44   46   45   47   48   47   41   48   45
    45   44   42   43   44   46   46   43   49   45

    (*a*) Construct a dot plot for the data.
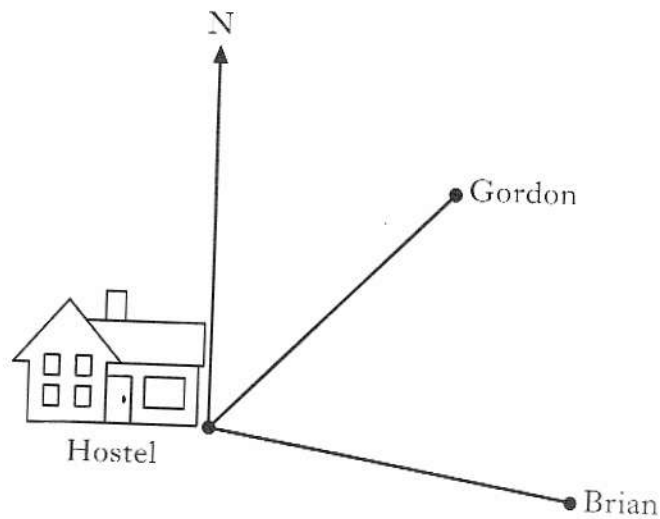
    2

    (*b*) Describe the shape of the distribution.

    1

    (*c*) What would you expect the "average contents per matchbox" to be ?

    1

    [Turn over

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.

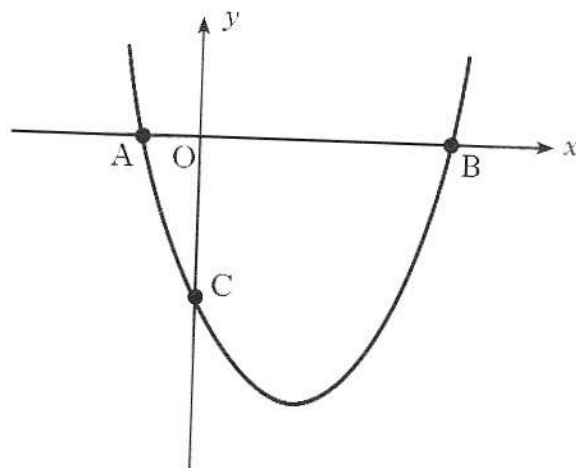Brian walks on a bearing of 100° at a speed of 4·8 kilometres per hour.

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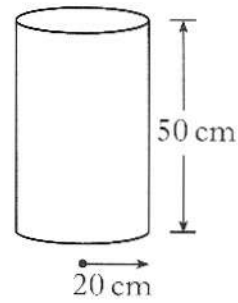
5.

The equation of the parabola in the above diagram 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**

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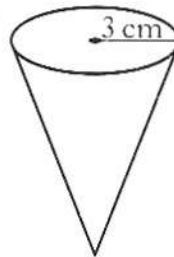
50 cm

20 cm

    (*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.

3 cm

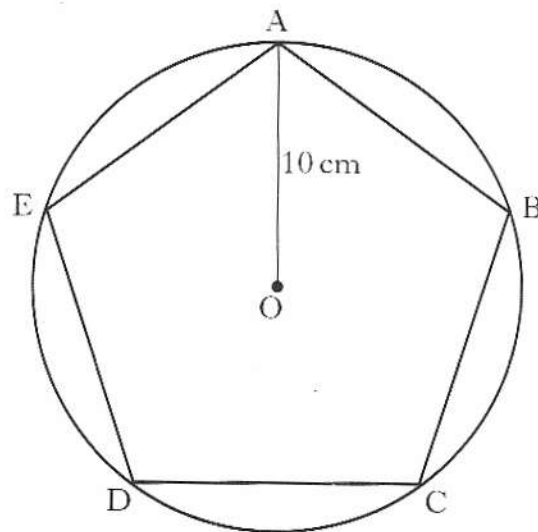   What will be the height of liquid in each cup?

4

7. Multiply out the brackets and collect like terms.

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

3

[Turn over

8.

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

Calculate the area of the regular pentagon.

5

9. (*a*) Express $a^2(2a^{-\frac{1}{2}} + a)$ in its simplest form.

2

(*b*) Solve the quadratic equation

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

using an appropriate formula.

Give your answers correct to 1 decimal place.

4

Marks

10. 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.
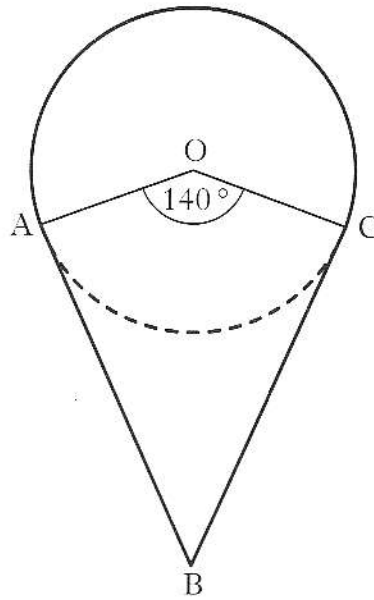
5

11. (a) Solve the equation

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

3

(b) Show that

$$\tan x° \cos x° = \sin x°.$$

2

[END OF QUESTION PAPER]