X100/201

NATIONAL QUALIFICATIONS 2002

MONDAY, 27 MAY
1.00 PM – 1.45 PM

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.

LIB X100/201 6/21570

ALL questions should be attempted.

Marks

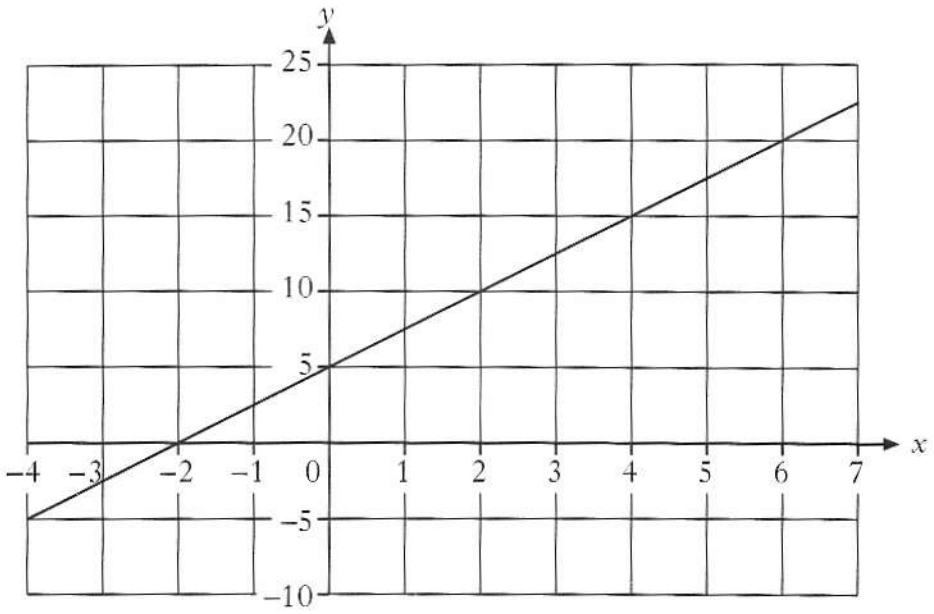
1. In a tournament a group of golfers recorded the following scores.

74	70	71	73	75	74	73	72
72	75	71	76	74	72	70	73

(*a*) Construct a frequency table from the above data and add a cumulative frequency column. **2**

(*b*) What is the probability that a golfer chosen at random from this group recorded a score of less than 72? **1**

2.

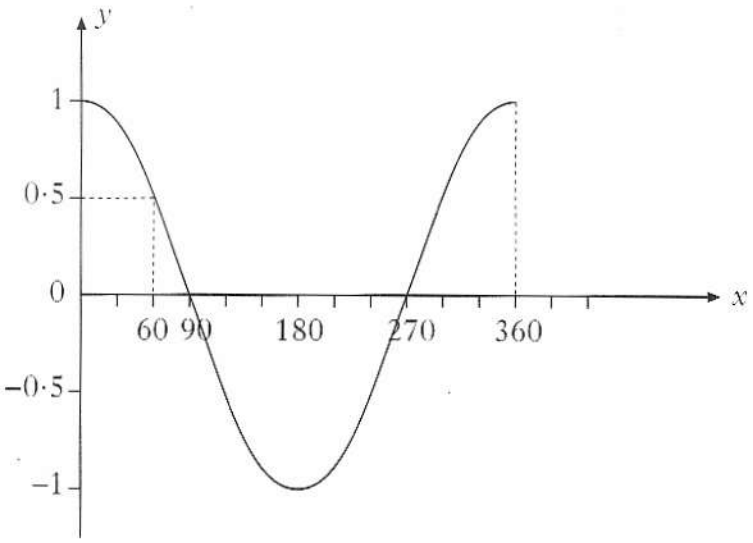


Find the equation of the straight line shown in the diagram. **3**

[Turn over

Marks

3.



Part of the graph of $y = \cos x°$ is shown above.

If $\cos 60° = 0{\cdot}5$, state two values for x for which $\cos x° = -0{\cdot}5$, $0 \leq x \leq 360$. **2**

4. Multiply out the brackets and collect like terms.

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

5. A sample of students was asked how many times each had visited the cinema in the last three months.

The results are shown below.

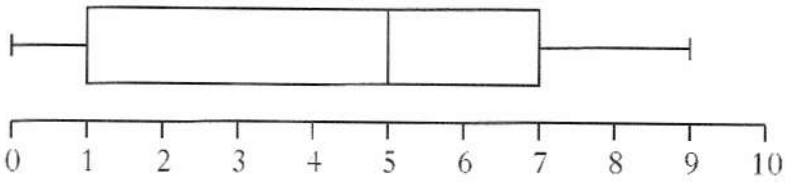
4	5	4	1	4	3	2	2	4	6	2
3	4	4	1	3	1	2	3	1	1	

(*a*) From the above data, find the median, the lower quartile and the upper quartile. **3**

(*b*) Construct a boxplot for the data. **2**

(*c*) The same sample of students was asked how many times each had attended a football match in the same three months.

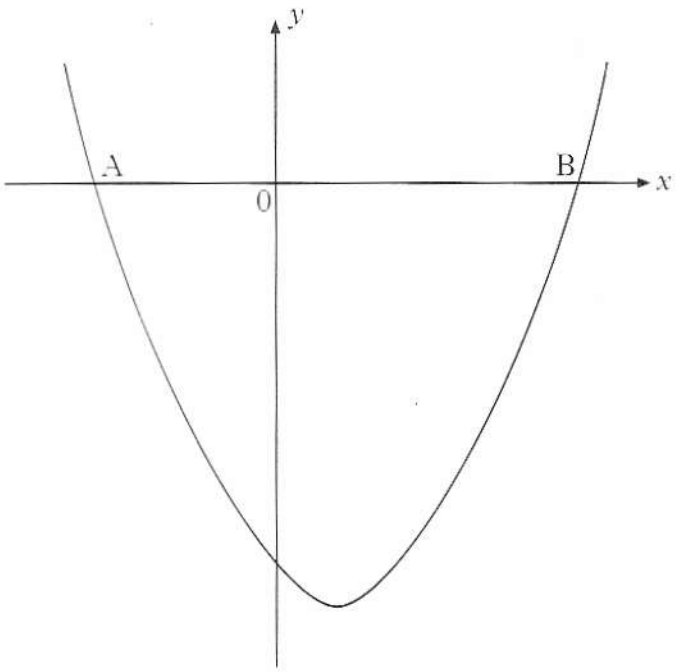
The boxplot below was drawn for this data.



Compare the two boxplots and comment. **1**

Marks

6.



The equation of the parabola in the above diagram is

$$y = (x - 1)^2 - 16.$$

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

(*b*) State the equation of the axis of symmetry of the parabola. **1**

(*c*) The parabola cuts the x-axis at A and B. Find the length of AB. **3**

7. (*a*) Express $\sqrt{45} - 2\sqrt{5}$ as a surd in its simplest form. **2**

(*b*) Express as a fraction in its simplest form

$$\frac{1}{x^2} + \frac{1}{x}, \qquad x \neq 0. \qquad \textbf{2}$$

[END OF QUESTION PAPER]

X100/203

NATIONAL QUALIFICATIONS 2002

MONDAY, 27 MAY
2.05 PM – 3.35 PM

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.

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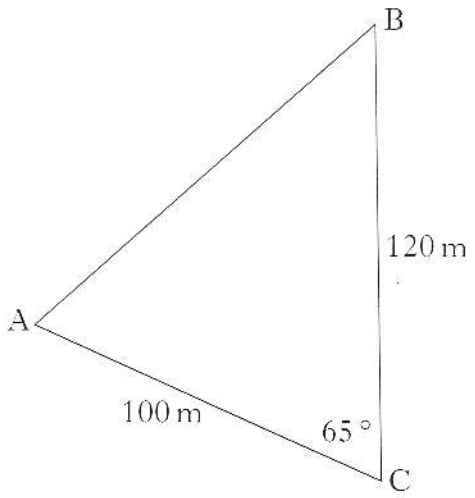
SCOTTISH QUALIFICATIONS AUTHORITY

ALL questions should be attempted.

Marks

1. The sketch shows a triangle, ABC.



Calculate the area of the triangle. **2**

2. Solve **algebraically** the system of equations

$$3x - 2y = 11$$
$$2x + 5y = 1.$$

3

3. (*a*) The price, in pence, of a carton of milk in six different supermarkets is shown below.

66 70 89 75 79 59

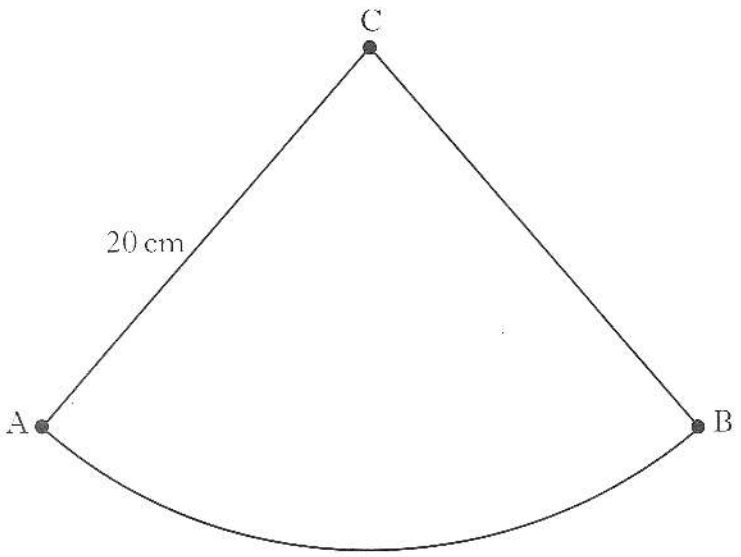
Use an appropriate formula to calculate the mean and standard deviation of these prices.
Show clearly all your working. **4**

(*b*) In six local shops, the mean price of a carton of milk is 73 pence with a standard deviation of 17·7.
Compare the supermarket prices with those of the local shops. **2**

[Turn over

Marks

4. A pendulum travels along an arc of a circle, centre C.



The length of the pendulum is 20 centimetres.
The pendulum swings from A to B.
The length of the arc AB is 28·6 centimetres.
Find the angle through which the pendulum swings from A to B. **4**

5. (*a*) (i) Factorise completely

$$3y^2 - 6y.$$ **1**

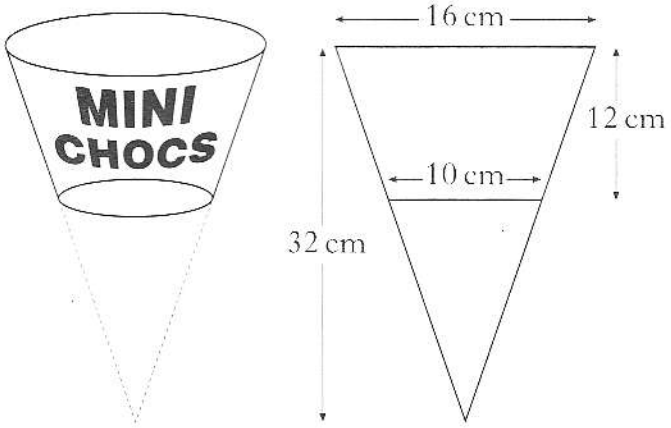
(ii) Factorise

$$y^2 + y - 6.$$ **2**

(*b*) Hence express $\frac{3y^2 - 6y}{y^2 + y - 6}$ in its simplest form. **2**

Marks

6. A container to hold chocolates is in the shape of part of a cone with dimensions as shown below.



Calculate the volume of the container.
Give your answer correct to one significant figure. **5**

7. Solve the equation

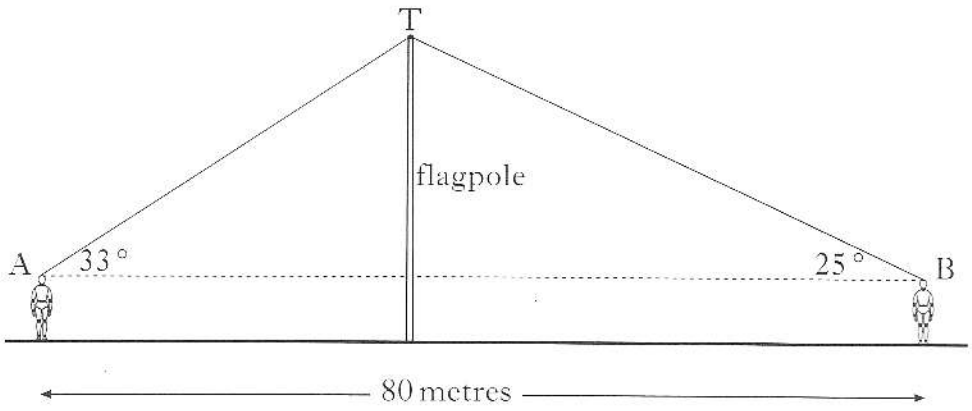
$$2x^2 + 3x - 1 = 0,$$

giving your answers correct to one decimal place. **4**

[Turn over

Marks

8. The diagram shows two positions of a surveyor as he views the top of a flagpole.



From position A, the angle of elevation to T at the top of the flagpole is 33°.

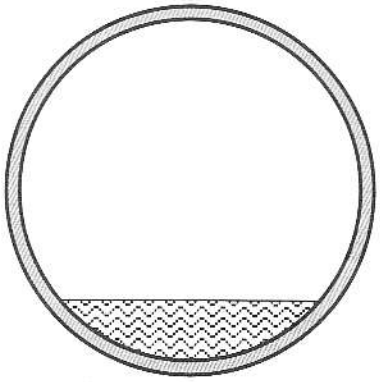
From position B, the angle of elevation to T at the top of the flagpole is 25°.

The distance AB is 80 metres and the height of the surveyor to eye level is 1·6 metres.

Find the height of the flagpole. 6

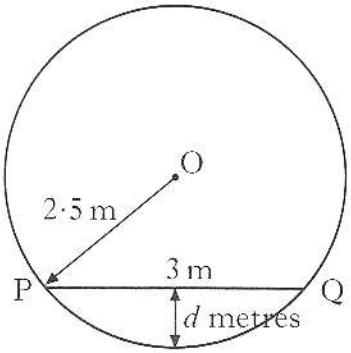
Marks

9. The diagram below shows a circular cross-section of a cylindrical oil tank.



In the figure below,

- O represents the centre of the circle
- PQ represents the surface of the oil in the tank
- PQ is 3 metres
- the radius OP is 2·5 metres.



Find the depth, d metres, of oil in the tank. **4**

10. The population of Newtown is 50 000.

The population of Newtown is **increasing** at a steady rate of 5% per annum.

The population of Coaltown is 108 000.

The population of Coaltown is **decreasing** at a steady rate of 20% per annum.

How many years will it take until the population of Newtown is greater than the population of Coaltown? **5**

[Turn over for Questions 11 and 12 on *Page eight*

Marks

11. (*a*) Simplify

$$6x^{\frac{3}{2}} \div 2x^{\frac{1}{2}}.$$

2

(*b*) Change the subject of the formula

$$r = 3p + 2t$$

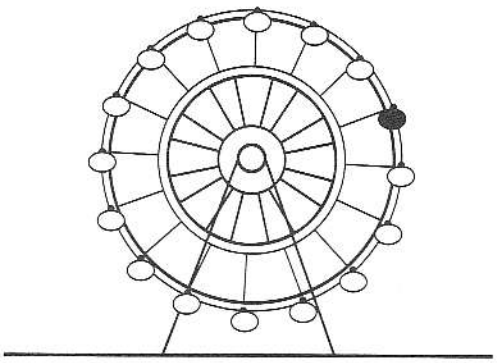
to p.

2

12. At the carnival, the height, H metres, of a carriage on the big wheel above the ground is given by the formula

$$H = 10 + 5 \sin t°,$$

t seconds after starting to turn.



(*a*) Find the height of the carriage above the ground after 10 seconds. 2

(*b*) Find the **two** times during the first turn of the wheel when the carriage is 12·5 metres above the ground. 4

[END OF QUESTION PAPER]