

# X101/11/01

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NATIONAL  
QUALIFICATIONS 2013

WEDNESDAY, 22 MAY  
9.00 AM – 9.45 AM

MATHEMATICS  
INTERMEDIATE 2  
Units 1, 2 and  
Applications of Mathematics  
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. If you make use of this, you should write your name on it clearly and put it inside your answer booklet.



## FORMULAE LIST

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:  $\text{Area} = \frac{1}{2}ab \sin C$

Volume of a sphere:  $\text{Volume} = \frac{4}{3}\pi r^3$

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

Volume of a cylinder:  $\text{Volume} = \pi r^2 h$

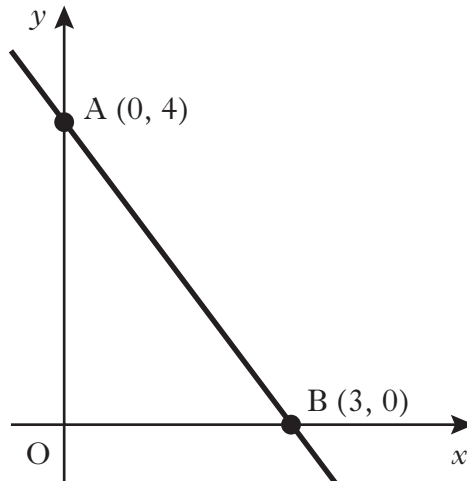
Standard deviation:  $s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}} = \sqrt{\frac{\sum x^2 - (\sum x)^2 / n}{n-1}}$ , where  $n$  is the sample size.

1. Factorise

$$6ab - 7bc.$$

1

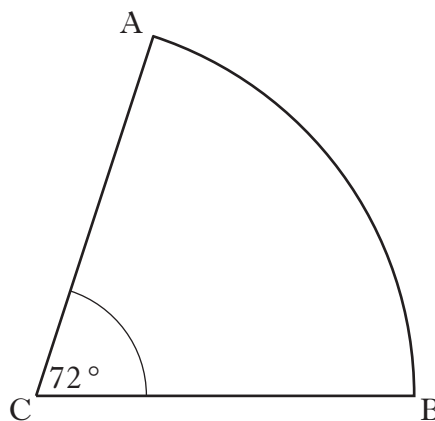
- 2.



Find the equation of the straight line AB.

3

3. The diagram below shows a sector of a circle, centre C.



The radius of the circle is 5 centimetres and angle ACB is  $72^\circ$ .

Calculate the length of arc AB.

Take  $\pi = 3.14$ .

3

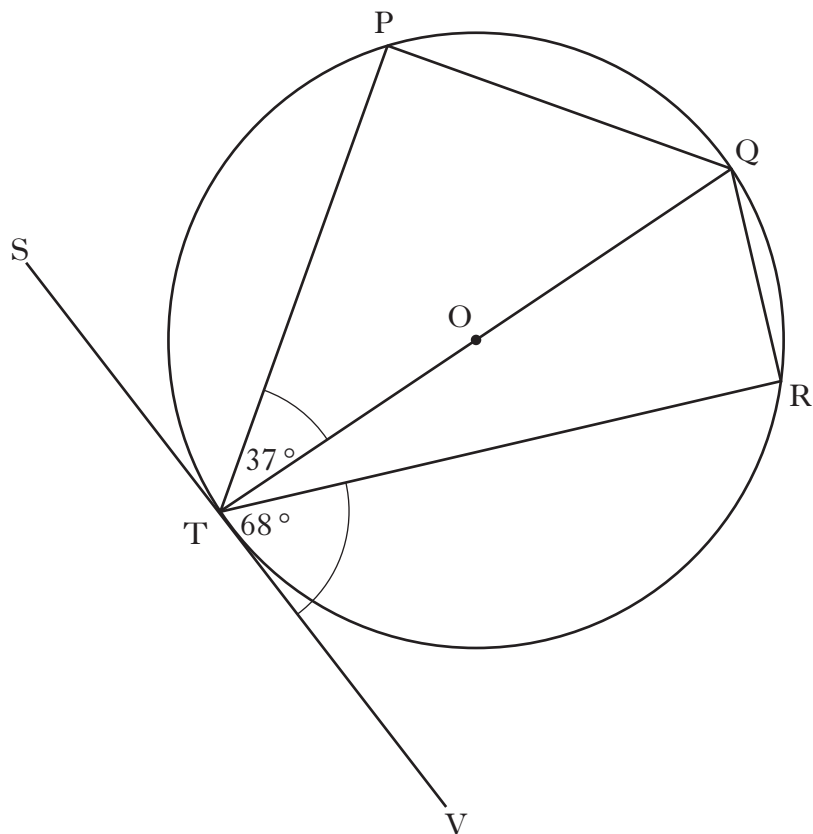
[Turn over

4. Solve algebraically the system of equations

$$\begin{aligned} 2x - y &= 10 \\ 4x + 5y &= 6. \end{aligned}$$

3

5.



The tangent SV touches the circle, centre O, at T.

Angle PTQ is  $37^\circ$  and angle VTR is  $68^\circ$ .

Calculate the size of angle PQR.

3

6. The stem and leaf diagram shows the number of minutes on average spent on homework per night by a group of first year pupils.

1	0 5 5 5
2	0 1 2 2 3 5 5 8 9
3	0 5 5 6 6 7 8 9 9 9
4	2 4 4 5 6 7
5	0

n = 30

1 | 0 represents 10 minutes

- (a) Using the above data find:

- (i) the median;

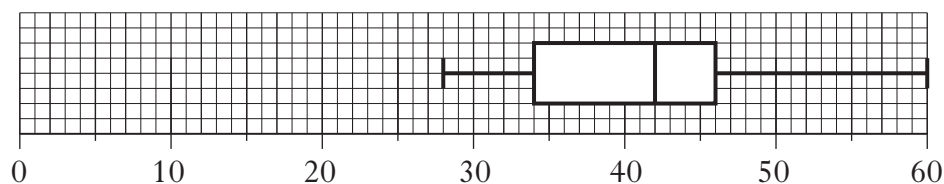
**1**
- (ii) the lower quartile;

**1**
- (iii) the upper quartile.

**1**

- (b) Draw a boxplot to illustrate this data. **2**

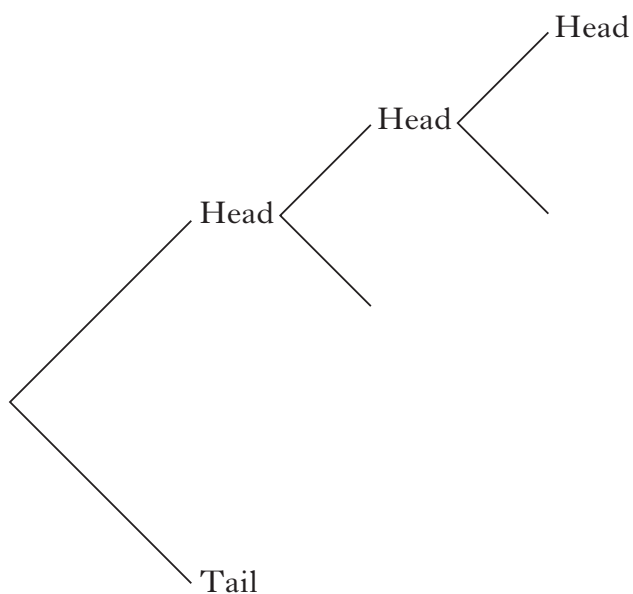
- (c) A group of fourth year pupils was surveyed to find out how many minutes on average they spent on homework per night. The boxplot below was drawn for this data.



- Compare the two boxplots and comment. **2**

**[Turn over**

7. **Anna** tosses a coin **three** times.



(a) Copy and complete the above tree diagram to show **all** the possible results. **3**

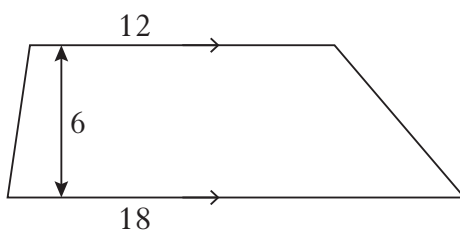
(b) What is the probability that, out of three tosses, she gets exactly one tail? **1**

8. The area of a trapezium is calculated by

$$A = \frac{1}{2}(a + b)h$$

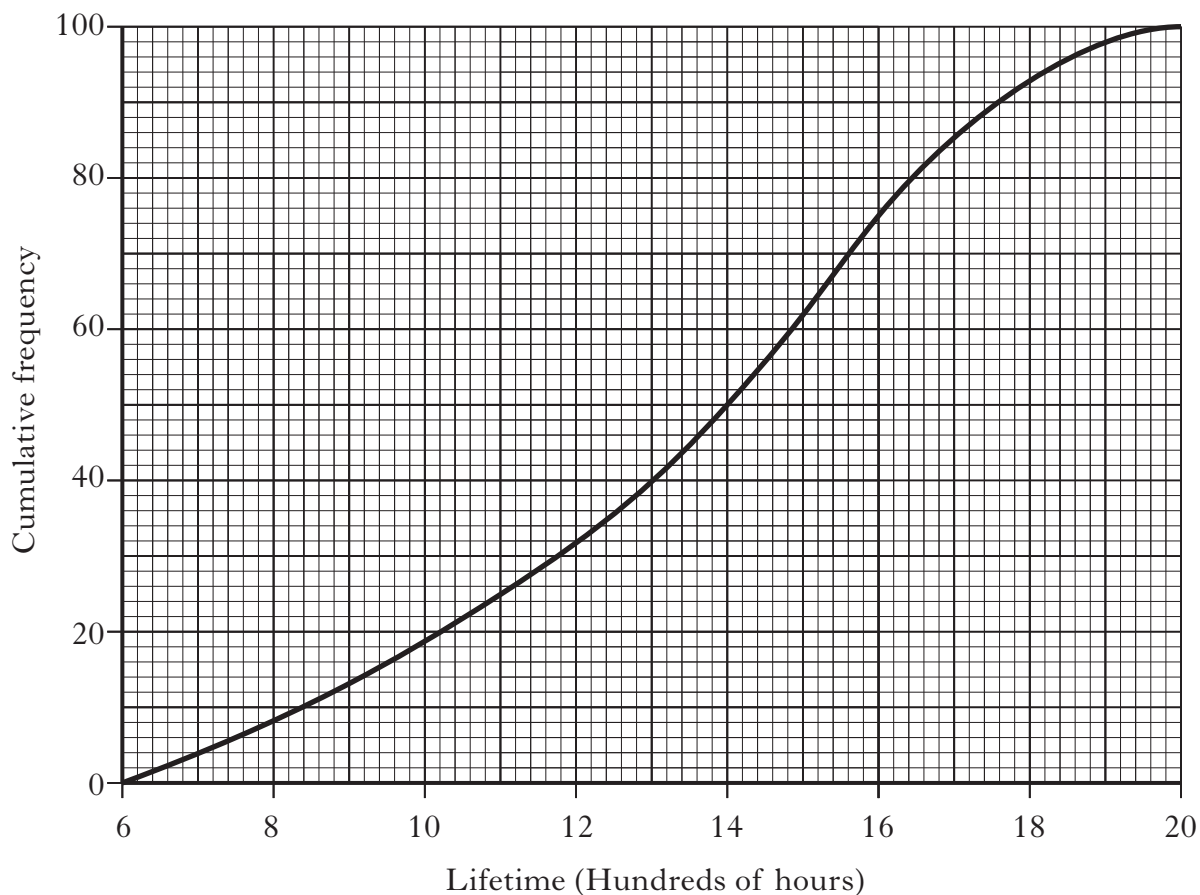
where  $a$  and  $b$  are the parallel sides and  $h$  is the vertical distance between them.

Calculate the area of the trapezium below.



2

9. A company which manufactures light bulbs tests the lifetime of a sample of 100 bulbs. The results are shown in the cumulative frequency curve below.



- (a) State the median lifetime for the data represented in the diagram. 1
- (b) Calculate the semi-interquartile range. 3

[END OF QUESTION PAPER]

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