

# 2500/31/01

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NATIONAL  
QUALIFICATIONS  
2013

FRIDAY, 3 MAY  
1.30 PM – 2.25 PM

MATHEMATICS  
STANDARD GRADE  
Credit Level  
Paper 1  
(Non-calculator)

- 1 You may **NOT** use a calculator.
- 2 Answer as many questions as you can.
- 3 Full credit will be given only where the solution contains appropriate working.
- 4 Square-ruled paper is provided inside your answer booklet.

Use **blue** or **black** ink. Pencil may be used for graphs and diagrams only.



## FORMULAE LIST

The roots of  $ax^2 + bx + c = 0$  are  $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

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

**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

$$86.5 - 3.651 \times 20.$$

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2

2. Evaluate

$$\frac{1}{2} \div 2\frac{2}{3}.$$

2

3. A group of people attended a course to help them stop smoking.

The following table shows the statistics before and after the course.

	<i>Mean number of cigarettes smoked per person per day</i>	<i>Standard deviation</i>
Before	20.8	8.5
After	9.6	12.0

2

Make **two** valid comments about these results.

4. Change the subject of the formula to  $r$ .

$$A = 4\pi r^2.$$

2

[Turn over

5. 150 patients have been given a flu vaccine.

The data is shown in the table below.

<i>AGE</i>	<i>GENDER</i>	
	<i>male</i>	<i>female</i>
5 or under	4	3
6 – 15	7	8
16 – 59	37	47
60 or over	12	32

What is the probability that

(a) a patient given the flu vaccine was male **and** aged 60 or over?

1

(b) a patient given the flu vaccine was aged 5 or under?

1

6. Joan buys gold and silver charms to make bracelets.

2 gold charms and 5 silver charms cost £125.

(a) Let  $g$  pounds be the cost of one gold charm and  $s$  pounds be the cost of one silver charm.

Write down an equation in terms of  $g$  and  $s$  to illustrate the above information.

1

4 gold charms and 3 silver charms cost £145.

(b) Write down another equation in terms of  $g$  and  $s$  to illustrate this information.

1

(c) Hence calculate the cost of each type of charm.

3

7. (a) Expand and simplify

$$(2x - 5)(x^2 + 3x - 7).$$

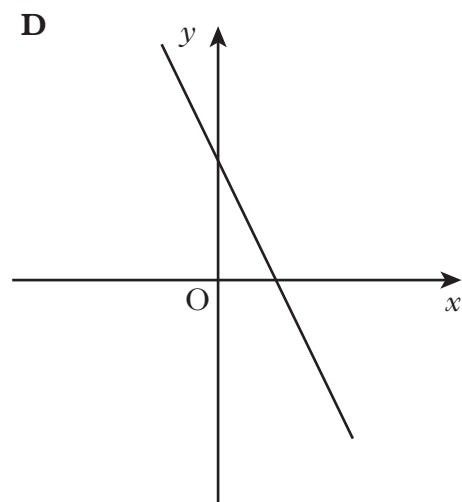
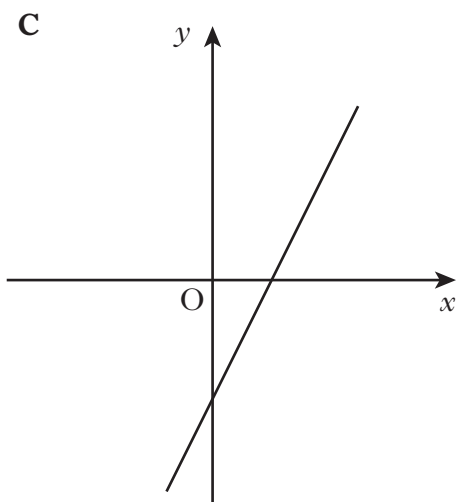
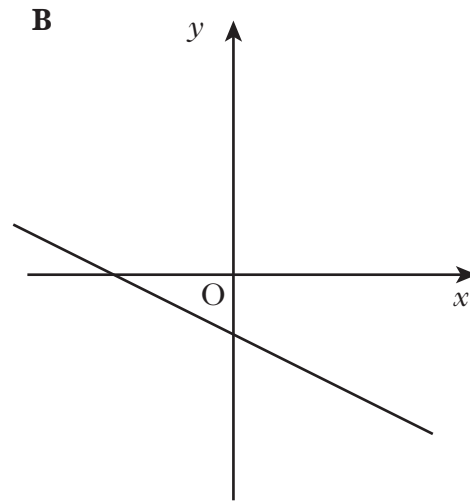
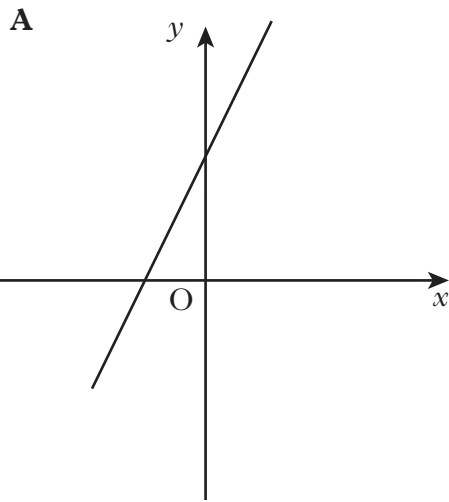
(b) Solve the inequality

$$4x - 5 \leq 7x - 20.$$

3

3

8. Four straight line graphs are shown below.



Which one of these above could represent the line with equation  $2x + y = 3$ ?

**Give two reasons to justify your answer.**

3



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**11.** Jenny is doing calculations using consecutive numbers.

She notices a pattern which always gives an answer of 1.

Using 2, 3, 4 gives  $3^2 - 2 \times 4 = 1$ .

3, 4, 5 gives  $4^2 - 3 \times 5 = 1$ .

4, 5, 6 gives  $5^2 - 4 \times 6 = 1$ .

(a) Using 8, 9, 10, write down a similar pattern.

(b) Using  $n$ ,  $(n+1)$ ,  $(n+2)$ , show that the answer is 1 for any three consecutive numbers.

*[END OF QUESTION PAPER]*

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## 2500/31/02

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NATIONAL  
QUALIFICATIONS  
2013

FRIDAY, 3 MAY  
2.45 PM – 4.05 PM

MATHEMATICS  
STANDARD GRADE  
Credit Level  
Paper 2

- 1 You may use a calculator.
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1. A snail crawls 3 kilometres in 16 days.

What is the average speed of the snail in metres per second?

Give your answer **in scientific notation correct to 2 significant figures**.

4

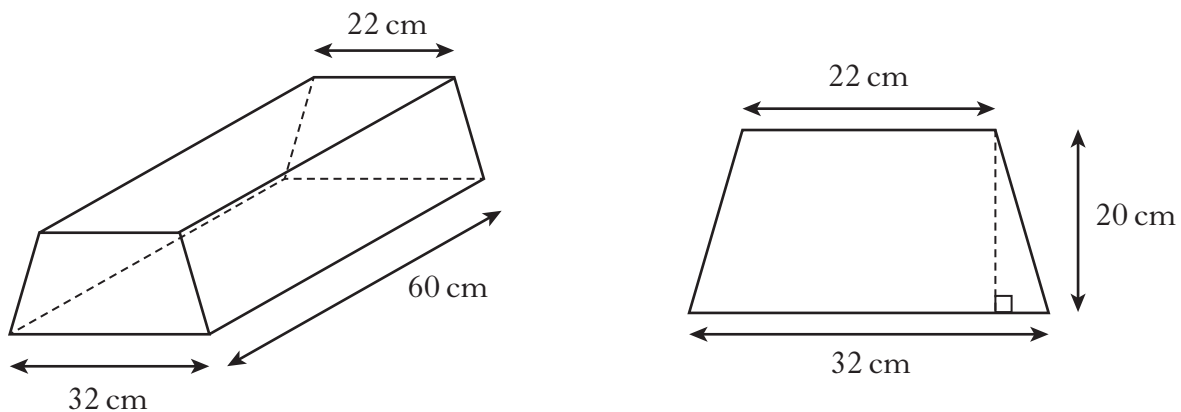
2. Solve the equation

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

Give your answers **correct to 1 decimal place**.

4

3. A concrete block is in the shape of a prism.



The cross section of the prism is a trapezium with dimensions as shown.

- (a) Calculate the area of the cross section.  
 (b) Calculate the volume of the concrete block.

3

1

[Turn over

4. Last year, 1296 learner drivers from “Topflight” school of motoring passed their driving test.

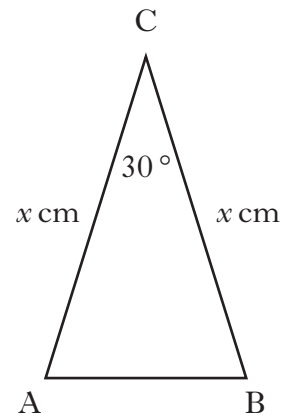
This was 72% of those who sat their driving test from Topflight.

How many **failed** their driving test?

3

5. ABC is an isosceles triangle with angle  $ACB = 30^\circ$ .

$AC = BC = x$  centimetres.



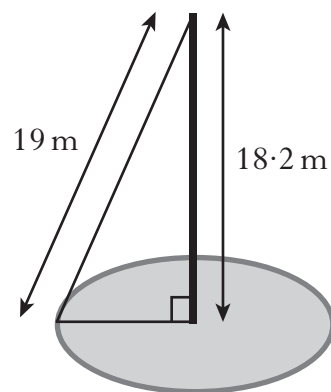
The area of triangle ABC is 9 square centimetres.

Calculate the value of  $x$ .

3

6. A mobile phone mast, 18.2 metres high, stands vertically in the centre of a circle.

It is supported by a wire rope, 19 metres long, attached to the ground at a point on the circumference of the circle, as shown.



Calculate the circumference of the circle.

3

7. Jack weighs 94 kilograms.

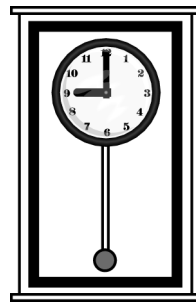
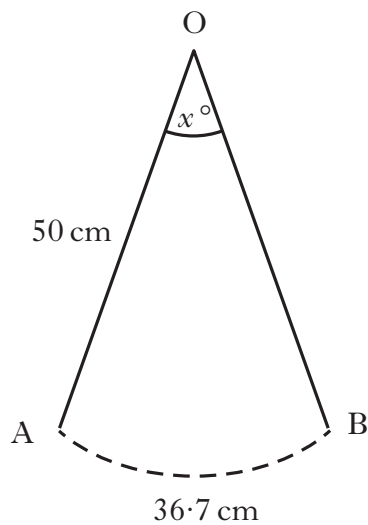
On the 1st of January, he starts a diet which is designed to reduce his weight by 7% per month.

During which month should he achieve his target weight of 73 kilograms?

**Show all your working.**

4

8. As the pendulum of a clock swings, its tip moves through an arc of a circle.



The length of the pendulum is 50 centimetres.  
The length of the arc is 36.7 centimetres.

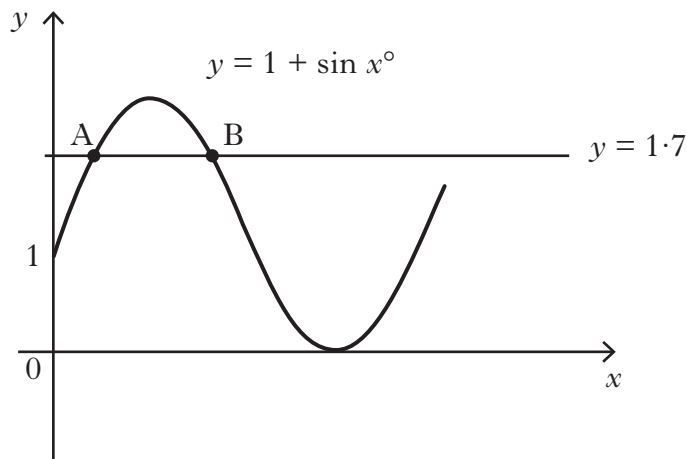
Calculate  $x^\circ$ , the angle through which the pendulum swings.

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12. Part of the graph of  $y = 1 + \sin x^\circ$  is shown in the diagram below.



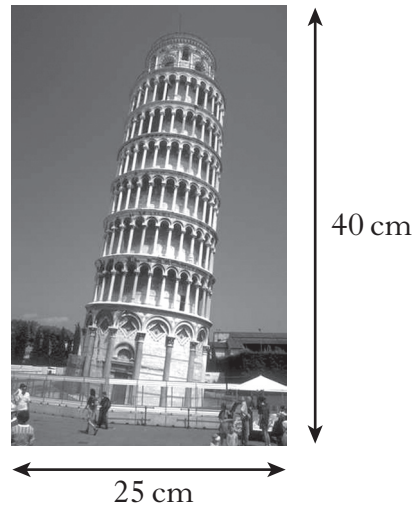
The line  $y = 1.7$  is drawn. It cuts the graph of  $y = 1 + \sin x^\circ$  at A and B as shown.

Calculate the x-coordinates of A and B.

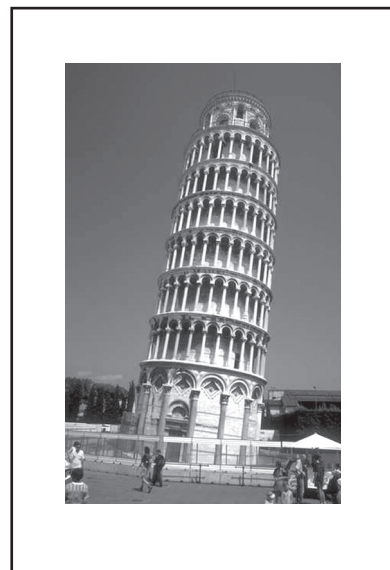
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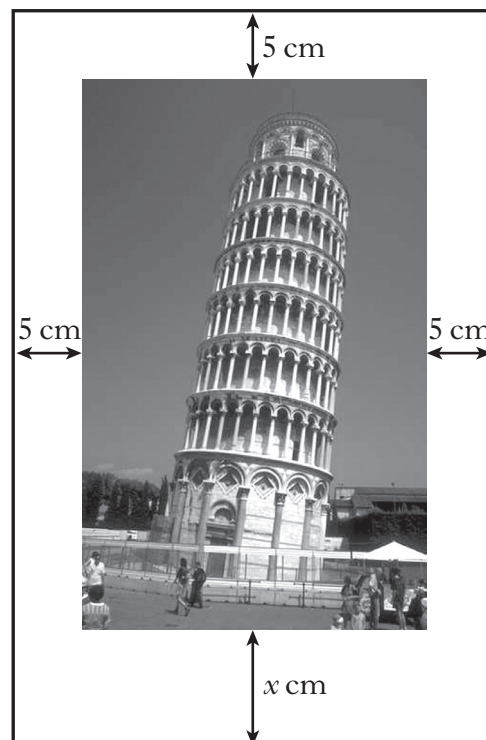
13. Asim has a poster which is 25 centimetres wide and 40 centimetres high.



He decides to place it on a white card.  
The card and the poster are mathematically similar.



The border is 5 centimetres wide on three sides and  $x$  centimetres wide on the fourth side as shown.

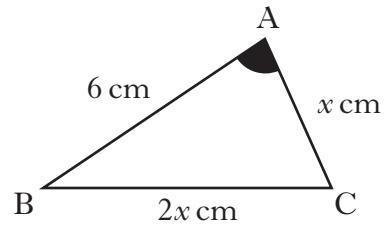


Calculate the value of  $x$ .



14. In triangle ABC:

- $\cos A = 0.5$
- $AB = 6$  centimetres
- $BC = 2x$  centimetres
- $AC = x$  centimetres.



Show that  $x^2 + 2x - 12 = 0$ .

[END OF QUESTION PAPER]

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