2500/405

NATIONAL QUALIFICATIONS 2001 WEDNESDAY, 16 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.



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

Area of a triangle: Area =
$$\frac{1}{2}ab \sin C$$

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

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

-	T 1
4	Evaluate

$$3.1 + 2.6 \times 4$$

KU RE

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2. Evaluate

$$3\frac{5}{8} + 4\frac{2}{3}$$
.

3. Given that $f(m) = m^2 - 3m$, evaluate f(-5).

2

4. Solve algebraically the equation

$$2x - \frac{(3x - 1)}{4} = 4.$$

3

5. A furniture maker investigates the delivery times, in days, of two local wood companies and obtains the following data.

Сотрапу	Minimum	Maximum	Lower Quartile	Median	Upper Quartile
Timberplan	16	56	34	38	45
Allwoods	18	53	22	36	49

- (a) Draw an appropriate statistical diagram to illustrate these two sets of data.
- (b) Given that consistency of delivery is the most important factor, which company should the furniture maker use? Give a reason for your answer.

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1

Turn over

6. A is the point (a^2, a) .

T is the point (t^2, t) , $a \neq t$

Find the gradient of the line AT.

Give your answer in its simplest form.

7. A garage carried out a survey on 600 cars.

The results are shown in the table below.

Engine size (cc)

Age

	0–1000	1001–1500	1501–2000	2001+
Less than 3 years	50	80	160	20
3 years or more	60	100	120	10

- (a) What is the probability that a car, chosen at random, is less than 3 years old?
- (b) In a sample of 4200 cars, how many would be expected to have an engine size greater than 2000cc **and** be 3 or more years old?

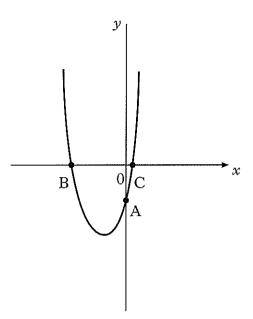
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The diagram below shows part of the graph of $y = 4x^2 + 4x - 3$. 8. The graph cuts the y-axis at A and the x-axis at B and C.



- (a) Write down the coordinates of A.
- (b) Find the coordinates of B and C.
- (c) Calculate the minimum value of $4x^2 + 4x 3$.
- A number pattern is shown below.

$$1^3 + 1 = (1+1)(1^2 - 1 + 1)$$

$$2^3 + 1 = (2 + 1)(2^2 - 2 + 1)$$

$$3^3 + 1 = (3+1)(3^2 - 3 + 1)$$

- (a) Write down a similar expression for $7^3 + 1$.
- (b) Hence write down an expression for $n^3 + 1$.
- (c) Hence find an expression for $8p^3 + 1$.

	3	2
[Turn over		1 2

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10.	Simplify	KU	RE
	$\frac{\sqrt{3}}{\sqrt{24}}$.		
	Express your answer as a fraction with a rational denominator.	3	
			· ranam
			-

11.	The intensity of light, I , emerging after passing through a liquid with concentration, c , is given by the equation		
	$I = \frac{20}{2^c} \qquad c \ge 0.$	4114 4404 4	7.77/2/2/2004
	(a) Find the intensity of light when the concentration is 3.	1	7.10.10.10.10.10.10.10.10.10.10.10.10.10.
	(b) Find the concentration of the liquid when the intensity is 10.	2	
	(c) What is the maximum possible intensity?		3
	$[END\ OF\ QUESTION\ PAPER]$		- Caraca

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NATIONAL QUALIFICATIONS 2001 WEDNESDAY, 16 MAY 2.45 PM - 4.05 PM

MATHEMATICS STANDARD GRADE Credit Level Paper 2

- 1 You may 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.



FORMULAE LIST

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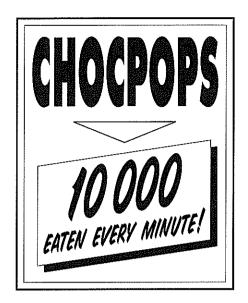
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$$\pi r^2 h$$

Standard deviation:
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, where *n* is the sample size.

1.



How many chocpops will be eaten in the year 2001? Give your answer in **scientific notation**.

2. The price, in pence per litre, of petrol at 10 city garages is shown below.

84·2 84·4 85·1 83·9 81·0 84·2 85·6 85·2 84·9 84·8

- (a) Calculate the mean and standard deviation of these prices.
- (b) In 10 rural garages, the petrol prices had a mean of 88.8 and a standard deviation of 2.4.

How do the rural prices compare with the city prices?

3. In 1999, a house was valued at £90000 and the contents were valued at £60000.

The value of the house appreciates by 5% each year.

The value of the contents **depreciates** by 8% each year.

What will be the **total** value of the house **and** the contents in 2002?

[Turn over

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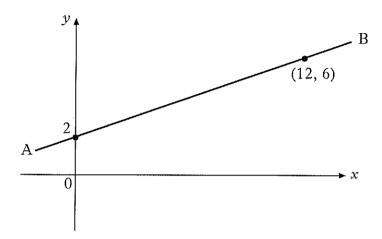
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4. A water pipe runs between two buildings.

These are represented by the points A and B in the diagram below.



- (a) Using the information in the diagram, show that the equation of the line AB is 3y x = 6.
- (b) An emergency outlet pipe has to be built across the main pipe. The line representing this outlet pipe has equation 4y + 5x = 46.

Calculate the coordinates of the point on the diagram at which the outlet pipe will cut across the main water pipe.

5. A cylindrical soft drinks can is 15 centimetres in height and 6.5 centimetres in diameter.

A new cylindrical can holds the same volume but has a reduced height of 12 centimetres.

What is the diameter of the new can?

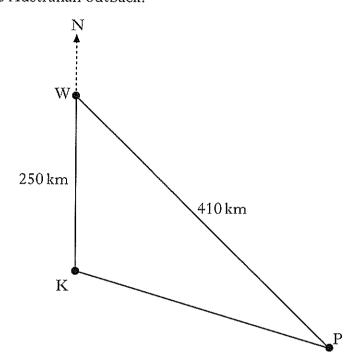
Give your answer to 1 decimal place.

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6. Three radio masts, Kangaroo (K), Wallaby (W) and Possum (P) are situated in the Australian outback.



Kangaroo is 250 kilometres due south of Wallaby.

Wallaby is 410 kilometres from Possum.

Possum is on a bearing of 130° from Kangaroo.

Calculate the bearing of Possum from Wallaby.

Do not use a scale drawing.

7. Solve algebraically the equation

$$\tan 40^{\circ} = 2\sin x^{\circ} + 1$$
 $0 \le x < 360$.

[Turn over

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KU RE

[2500/406]

A rectangular wall vent is 30 centimetres long and 20 centimetres wide. 11. It is to be enlarged by increasing both the length and the width by x centimetres.

KU RE

(a) Write down the length of the new vent.