

X100/11/01

NATIONAL TUESDAY, 19 MAY
QUALIFICATIONS 9.00 AM – 9.45 AM
2015

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. If you make use of this, you should write your name on it clearly and put it inside your answer booklet.



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

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.

ALL questions should be attempted.

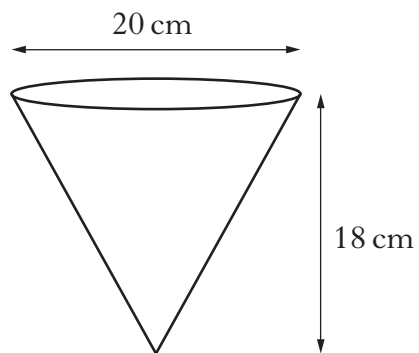
Marks

1. Multiply out the brackets and collect like terms.

$$(2x + 6)(5x - 3) + 9x$$

3

2. A hanging basket is in the shape of a cone.



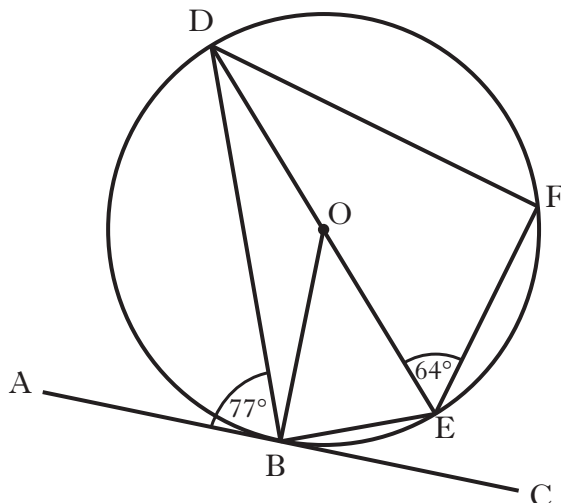
The diameter is 20 centimetres and the height is 18 centimetres.
Calculate the volume of the hanging basket.

Take $\pi = 3.14$.

2

[Turn over

3.



AC is a tangent to the circle, centre O, with point of contact B.

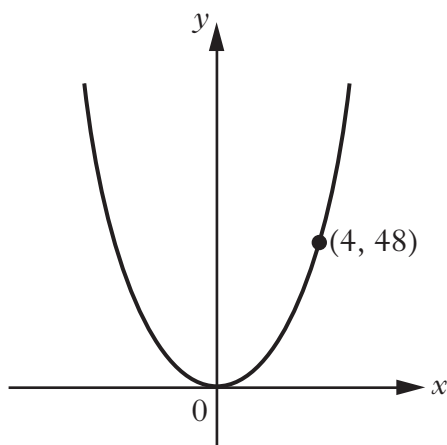
DE is a diameter of the circle and F is a point on the circumference.

Angle ABD is 77° and angle DEF is 64° .

Calculate the size of angle BDF.

3

4. The diagram below shows the graph with equation $y = kx^2$ passing through the point (4, 48).



Find the value of k .

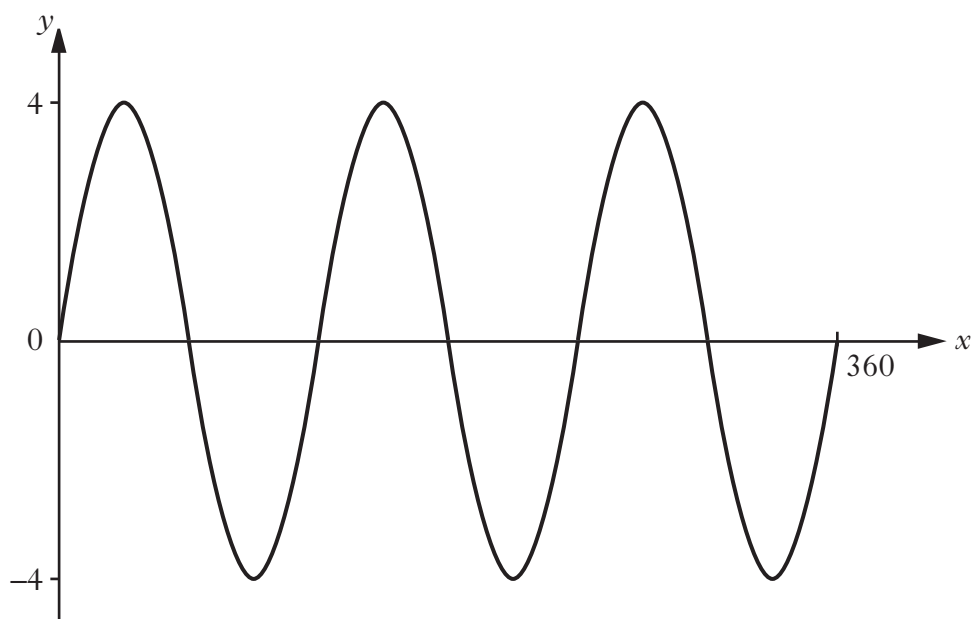
2

5. The standard deviation of 1, 2, 2, 2, 8 is equal to \sqrt{a} .

Find the value of a .

3

6. Part of the graph of $y = a \sin bx^\circ$ is shown in the diagram.

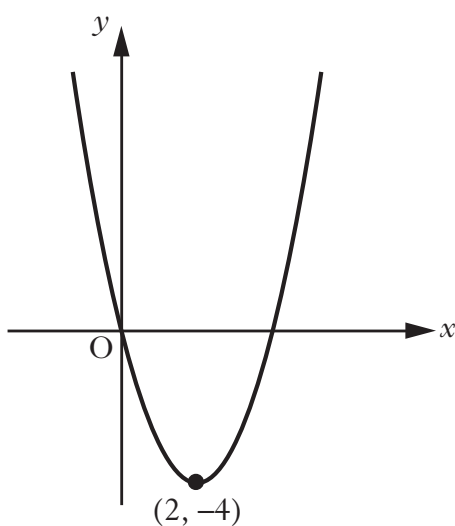


State the values of a and b .

2

7. The graph below shows part of the parabola with equation of the form

$$y = (x + a)^2 + b.$$



The minimum turning point $(2, -4)$ is shown in the diagram.

(a) State the values of:

(i) a

1

(ii) b .

1

(b) Write down the equation of the axis of symmetry of the graph.

1

8. Using **graphical** means, solve the system of equations:

$$y = 2x + 5$$

$$y = 3x + 6.$$

Use the squared paper provided.

3

9. Write the following in order of size starting with the smallest.

$$\cos 90^\circ$$

$$\cos 100^\circ$$

$$\cos 300^\circ$$

Justify your answer.

2

10. Express $\sqrt{45} + 6\sqrt{5} - \sqrt{20}$ as a surd in its simplest form.

3

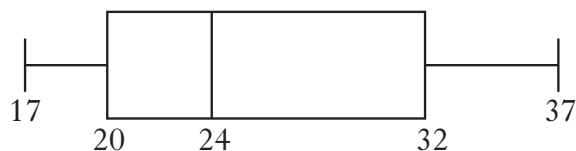
11. A straight line is represented by the equation $y = mx + c$.

Sketch a possible straight line graph to illustrate this equation when $m < 0$ and $c > 0$.

2

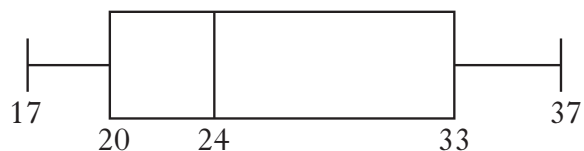
12. A book club has **seven** members.

The ages of the members have been used to construct the following boxplot.



After an **eighth** member joins the club, a new boxplot is drawn.

This boxplot is shown below.



What age is the eighth member?

2

[END OF QUESTION PAPER]

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