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## GCSE

## WJEC CBAC

## 4352/02

## MATHEMATICS (UNITISED SCHEME) <br> UNIT 2: Non-Calculator Mathematics HIGHER TIER

P.M. TUESDAY, 15 January 2013
$1 \frac{1}{4}$ hours

## CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

## INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.
Write your name, centre number and candidate number in the spaces at the top of this page.
Answer all the questions in the spaces provided.
If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.
Take $\pi$ as 3•14.

## INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.
Unless stated, diagrams are not drawn to scale.
Scale drawing solutions will not be acceptable where you are asked to calculate.
The number of marks is given in brackets at the end of each question or part-question.
You are reminded that assessment will take into account the quality of written communication (including mathematical communication) used in your answer to

| For Examiner's use only |  |  |
| :---: | :---: | :---: |
| Question | Maximum <br> Mark | Mark <br> Awarded |
| 1 | 7 |  |
| 2 | 3 |  |
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| 9 | 6 |  |
| 10 | 4 |  |
| 11 | 4 |  |
| 12 | 8 |  |
| 13 | 5 |  |
| TOTAL MARK |  |  | question 1.

## Formula List

Area of trapezium $=\frac{1}{2}(a+b) h$


Volume of prism $=$ area of cross-section $\times$ length

Volume of sphere $=\frac{4}{3} \pi r^{3}$
Surface area of sphere $=4 \pi r^{2}$


Volume of cone $=\frac{1}{3} \pi r^{2} h$
Curved surface area of cone $=\pi r l$


In any triangle $A B C$
Sine rule $\frac{a}{\sin A}=\frac{b}{\sin B}=\frac{c}{\sin C}$
Cosine rule $a^{2}=b^{2}+c^{2}-2 b c \cos A$
Area of triangle $=\frac{1}{2} a b \sin C$


## The Quadratic Equation

The solutions of $a x^{2}+b x+c=0$
where $a \neq 0$ are given by

$$
x=\frac{-b \pm \sqrt{\left(b^{2}-4 a c\right)}}{2 a}
$$

1. You will be assessed on the quality of your written communication in this question.

Ms Franks needs a total of $£ 1340$ to buy a car.
She already has $£ 584$ in a savings account.
Ms Franks earns $£ 1260$ per month.
She adds $15 \%$ of her salary each month to her savings account.
How many months will it take Ms Franks to save enough to buy the car?
You must show all your working.
2. Graham is thinking of setting up a 'spinner and dice stall' at his school's open evening to raise funds for a trip.
He needs to know some probabilities so that he can decide on the prizes.
He intends to spin the spinner and throw the dice shown below at the same time.


The score on the spinner is added to the score on the dice to obtain the total score. Find the probability that the total score will be 14 .
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3. (a) Make $q$ the subject of the following formula.

$$
3 q+h^{2}=m
$$

$3 q+h^{2}=m$
(b) Solve $\frac{3 x}{2}=15$.
4. The table shows values of $y=3 x^{2}+2 x-10$ for values of $x$ from -4 to 3 .

| $x$ | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $y=3 x^{2}+2 x-10$ | 30 |  | -2 | -9 | -10 | -5 | 6 | 23 |

(a) Complete the table above.
(b) On the graph paper below, draw the graph of $y=3 x^{2}+2 x-10$ for values of $x$ from -4 to 3 .

(c) Write down the $x$-coordinates of the points where the graph of $y=3 x^{2}+2 x-10$ intersects the $x$-axis.
5. (a) Find the $n$th term for the following sequence.

$$
12,9,6,3,0,-3, \ldots
$$

(b) Patterns are made using small squares.


Find an expression for the number of squares in Pattern $n$.
6. (a) Rafi has been asked to paint a region on a coordinate grid.

He is given the following criteria.
The region must be such that

- $\begin{aligned} & y \leqslant x \\ & x \leqslant 1\end{aligned}$
- $y \geqslant-2$

Use the grid below to show the region that Rafi needs to paint.


[^0]7. Catrin and Susie both have necklaces with chunky beads.

They notice that they have the same types of beads, but different numbers of each bead. The beads are either cubes or square based pyramids.
All the cubes are identical.
All the square based pyramids are identical.

Catrin's necklace


Susie's necklace


The girls both take the beads off their necklaces and place them in straight lines.


Diagrams not drawn to scale
(a) Calculate the length of an edge of the base of a pyramid and the length of an edge of a cube.
You must use an algebraic method.
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(b) Catrin's necklace string is 80 cm long.

How many extra cubic beads can Catrin place on her necklace?
8. (a) Arrange the following numbers in ascending order.
2100
$2.4 \times 10^{-3}$
$2.4 \times 10^{3}$
$10^{3}$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
Smallest $\qquad$
(b) Evaluate $6 \times 10^{13}+9 \times 10^{13}$, giving your answer in standard form.
$\qquad$
$\qquad$
$\qquad$
9. Use the following to find the equation of a straight line.

- The point that is halfway between $(3,20)$ and $(-3,16)$ lies on the straight line.
- When $(-1,10)$ is reflected in the $y$-axis, it gives another point on the straight line.

10. (a) Rotate the square through $90^{\circ}$ clockwise about the point $(2,1)$.

[2]
(b) Enlarge the square shown on the grid below by a scale factor of $-\frac{1}{2}$ using $(0,0)$ as the centre of enlargement.


11. The diagram shows a circle with centre $O$. The straight lines $R T$ and $S T$ are tangents to the circle, meeting the circle at $B$ and $C$ respectively.


Diagram not drawn to scale

Given that $B \widehat{T C} C=30^{\circ}$, calculate the size of $B \widehat{A C}$.
You must give reasons in your solution.
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## 12. (a) Evaluate $19^{0}$.

(b) Find the value of $(\sqrt{80}-\sqrt{5})^{2}$.
(c) Express $0 \cdot 42 \dot{8}$ as a fraction.
(d) Simplify $(\pi+3)(\pi-3)$.

Give your answer in terms of $\pi$.
13. A bowl contains 25 beans.

There are 6 kidney beans, 9 pinto beans and 10 black-eyed beans.
Two beans are selected at random from the bowl, without replacement.
(a) Calculate the probability that both of the beans are black-eyed beans.
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$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
(b) Calculate the probability that at least one pinto bean is selected.
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END OF PAPER

| Question number | Additional page, if required. Write the question numbers in the left-hand margin. |
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[^0]:    (b) Solve $8 x<3 x+40$.

