

MYDDELTON COLLEGE

Year 10 Entry Examination 2015



Mathematics - 1 hour

Answer all questions

Calculator needed

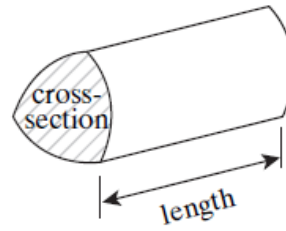
Name

Date

Formulae Sheet: Higher Tier

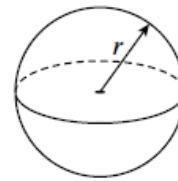
You may need to use the following formulae:

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



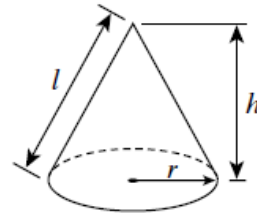
Volume of sphere = $\frac{4}{3} \pi r^3$

Surface area of sphere = $4 \pi r^2$



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

Curved surface area of cone = $\pi r l$

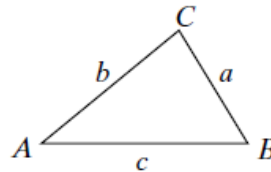


In any triangle ABC

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

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

1.

(a) Find the value of $7x + 2y$ when $x = 3$ and $y = -5$

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.....

Answer (2 marks)

(b) Find the value of $4x^2 - 5$ when $x = 3$

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.....

Answer (2 marks)

2.

Jack buys 1.5 kilograms of oranges at 98 pence per kilogram.
He also buys some bananas at 85 pence per kilogram.
His total bill is £2.49
What is the weight of the bananas that he buys?

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Answer kg (4 marks)

3.

Use approximations to estimate the value of $\frac{8012}{48.61 \times 0.397}$

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Answer (3 marks)

4.

(a) A sequence has n th term $4n + 1$

(i) Write down the first three terms of this sequence.

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Answer 1st term, 2nd term, 3rd term (2 marks)

(ii) Tom says that 2006 is a term in this sequence.
 Explain why he is wrong.

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(1 mark)

(b) A different sequence has n th term $(n + 3)^2 - 9$
 Show that the first term of this sequence is 7.

.....

(1 mark)

5.

The table shows the amounts needed to make 24 biscuits.

Ingredient	Amount for 24 biscuits	Amount for 36 biscuits
Sugar	80 g	
Flour	280 g	
Butter	190 g	

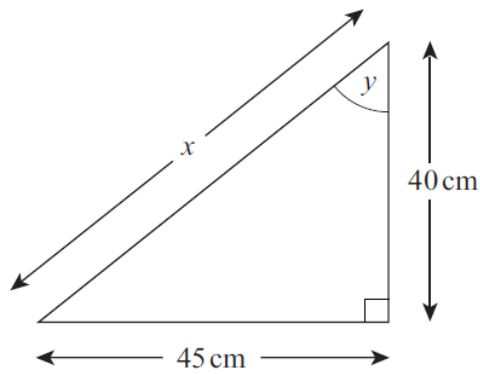
Calculate the amounts needed to make 36 biscuits.
 Write your answers in the table.

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(3 marks)

6.

A right-angled triangle has the dimensions shown.



Not drawn accurately

- (a) Calculate the length x .
Give your answer to a suitable degree of accuracy.

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Answer cm (4 marks)

- (b) Calculate the size of angle y .
Show your working.

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Answer degrees (3 marks)

7.

(a) (i) Solve $\frac{x}{3} - 2 = 5$

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Answer $x =$ (2 marks)

(ii) Solve $4x - 11 = 2(x + 3)$

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Answer $x =$ (3 marks)

(b) Expand and simplify $3(2x - 1) + 2(3x + 5)$

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Answer (2 marks)

(c) (i) Expand and simplify $(y + 5)(y - 1)$

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Answer (2 marks)

(ii) When y is an odd number, explain why $(y + 5)(y - 1)$ is an even number.

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(1 mark)

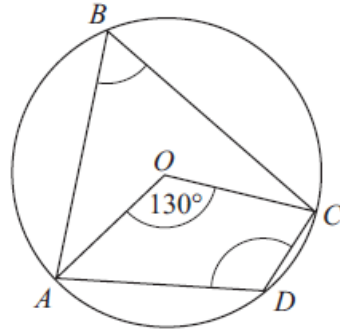
(d) Factorise $2xy - 6y^2$

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Answer (2 marks)

8.

- (a) A, B, C and D are points on the circumference of a circle centre O .
 $\angle AOC = 130^\circ$



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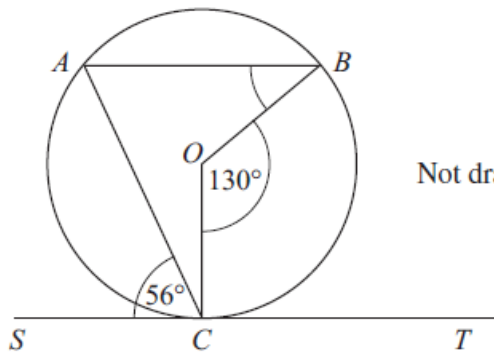
Work out the size of angles ABC and ADC .

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Answer Angle ABC degrees (1 mark)

Angle ADC degrees (1 mark)

- (b) A, B, C are three points on the circumference of a circle centre O .
 SCT is a tangent to the circle.
 $\angle SCA = 56^\circ$ $\angle COB = 130^\circ$



Not drawn accurately

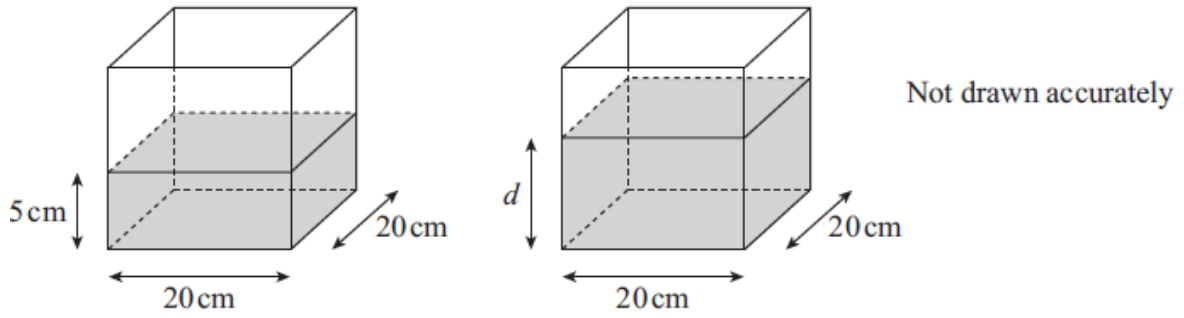
Find the size of angle OBA .

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Answer Angle OBA = degrees (3 marks)

9.

A water container is in the shape of a cuboid.
Its base is 20 cm by 20 cm and the depth of the water in the container is 15 cm.
Tony adds 1000 cm^3 of water to the container.



Calculate the new depth, d , of the water, in centimetres.

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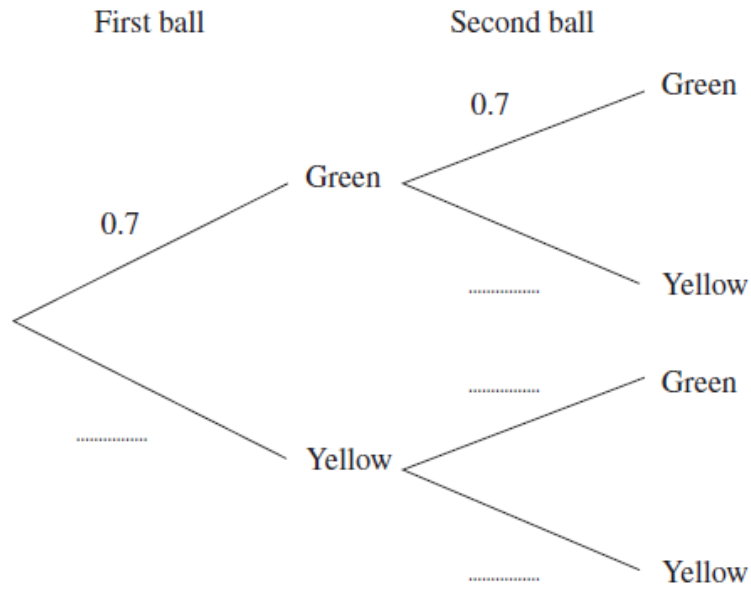
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Answer cm (4 marks)

10.

A bag contains 7 green and 3 yellow balls.
 A ball is taken from the bag at random and replaced.
 Another ball is then taken from the bag at random.

(a) Complete the tree diagram.



(1 mark)

(b) What is the probability that both balls are different colours?

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Answer (3 marks)

11.

(i) Factorise $x^2 - 13x + 30$

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Answer (2 marks)

(ii) Hence, solve the equation $x^2 - 13x + 30 = 0$

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Answer (1 mark)

END OF QUESTIONS