



**Surval Montreux  
Mathematics Entrance Assessment  
Grade 10 Entry**

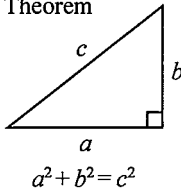
- Attempt all questions.
- You must show all relevant working.
- The use of calculators is permitted.
- There are a total of 11 questions on the paper.
- The total marks for the paper are 85.
- Time allowed: 1 h 30 minutes

Name \_\_\_\_\_

Date of Assessment \_\_\_\_\_

**IGCSE MATHEMATICS 4400  
FORMULA SHEET – HIGHER TIER**

Pythagoras' Theorem

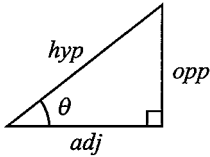
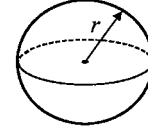
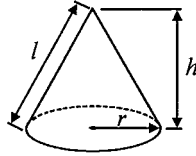


Volume of cone =  $\frac{1}{3} \pi r^2 h$

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

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

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



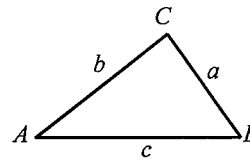
adj = hyp  $\times$  cos  $\theta$   
opp = hyp  $\times$  sin  $\theta$   
opp = adj  $\times$  tan  $\theta$

or  $\sin \theta = \frac{\text{opp}}{\text{hyp}}$

$\cos \theta = \frac{\text{adj}}{\text{hyp}}$

$\tan \theta = \frac{\text{opp}}{\text{adj}}$

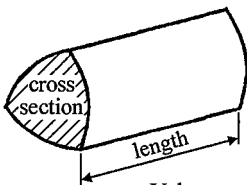
In any triangle ABC



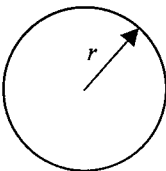
Sine rule  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



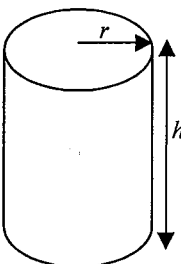
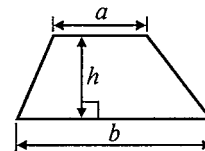
Volume of prism = area of cross section  $\times$  length



Circumference of circle =  $2\pi r$

Area of circle =  $\pi r^2$

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



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

Curved surface area of cylinder =  $2\pi r h$

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 formula for calculating  $X$  is given by:

$$X = \frac{Mmg}{M + m}.$$

Find the value of  $X$  when  $m = 0.6$ ,  $M = 2.7$  and  $g = 9.8$ .  
Give your answer correct to 3 significant figures.

..... [2]

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2. (a) Multiply out and simplify  $(5x - 2y)(3x - 4y)$ .

..... [2]

(b) Factorise fully:

(i)  $6y^2 - 8y$

..... [2]

(ii)  $6y^2 - 54$

..... [2]

(iii)  $y^2 + y - 6$

..... [3]

3. (a) Find the gradient of each of the straight lines whose equations are given:

(i)  $y = 2x$

..... [1]

(ii)  $2y + x = 0$

..... [2]

(iii)  $3x - 4y = 5$

..... [2]

(b) Calculate the gradient of the straight line joining the points with co-ordinates  $(-2, 5)$  and  $(1, -3)$ .

..... [1]

(c) Find the distance between the points  $(-1, -3)$  and  $(7, 12)$ .

..... [2]

4. (a) Solve the simultaneous equations:

$$4x + 5y = 14$$

$$3x - 2y = 45$$

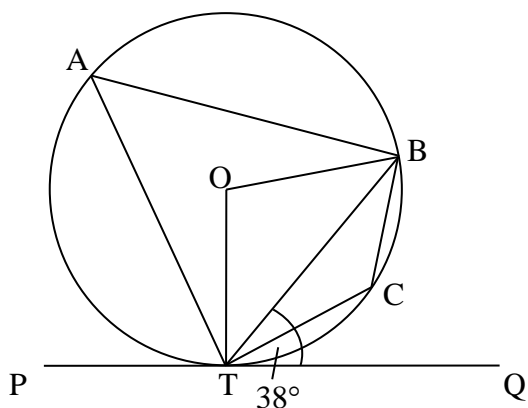
..... [3]

(b) Solve the quadratic equation giving your answers correct to 2 d.p.

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

..... [3]

5. In the diagram PTQ is a tangent to the circle at T. O is the centre of the circle.  
Angle QTB = 38°.



Work out the size of the angles:

- (a) TAB

.....° [1]

- (b) TOB

.....° [2]

- (c) TCB

.....° [2]

- (D) TBO

.....° [2]

6. Write as a single fraction:

(a)  $\frac{x}{y} \times \frac{2}{y}$

..... [1]

(b)  $\frac{x}{x-2} - \frac{3}{x}$

..... [2]

(c)  $\frac{6}{3x-1} - \frac{2}{x-2}$

..... [3]

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7. Solve the simultaneous equations, giving your answers correct to 2 d.p.

$$y = 2x - 1$$

$$y^2 = 9x$$

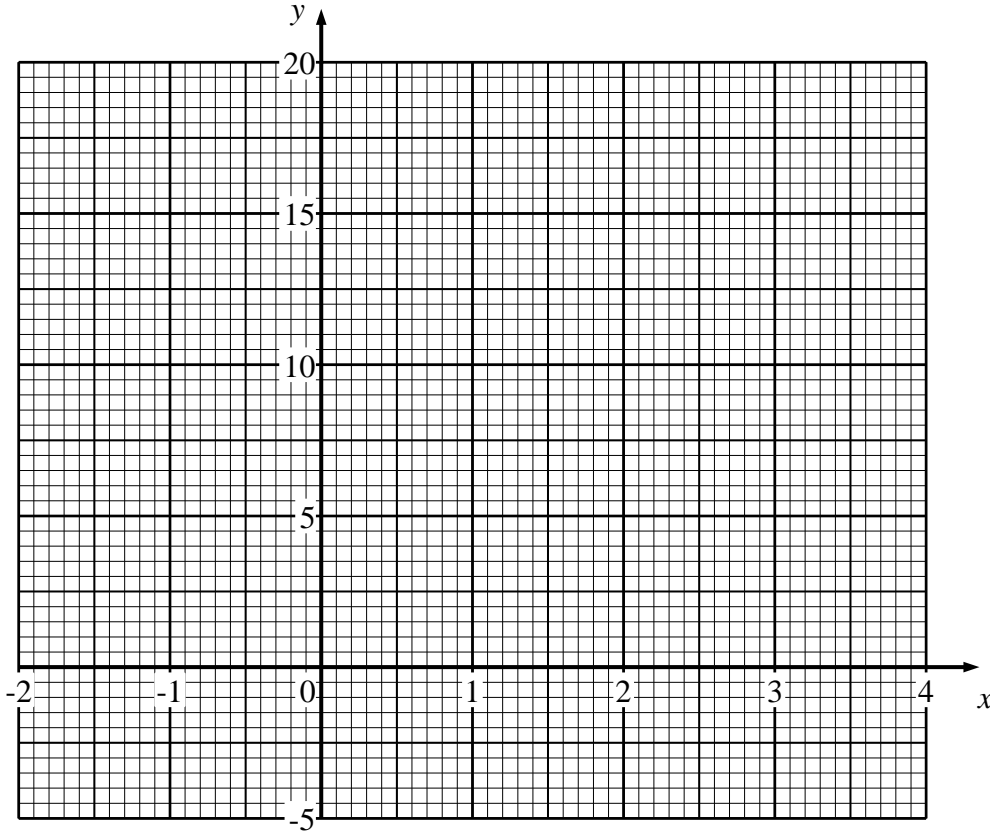
..... [5]

8. (a) Complete the table of values for  $y = 2x^2 - 4x$ .

$x$	-2	-1	0	1	2	3	4
$y$	16		0			6	

[2]

(b) Plot the graph of  $y = 2x^2 - 4x$  on the axes below.



[3]

(c) Use your graph to find solutions of the equations:

(i)  $2x^2 - 4x = 0$

..... [2]

(ii)  $2x^2 - 4x = 10$

..... [2]

(d) By drawing an appropriate straight line on your graph estimate the solutions of the equation

$$2x^2 - 5x - 5 = 0$$

..... [4]

(e) By drawing a tangent estimate the gradient of  $2x^2 - 4x$  at  $x = 2$

[4]

.....

9. In this question,  $f(x) = 2x^2$ ,  $g(x) = 7x - 3$  and  $h(x) = \frac{1}{x}$ .

(a) Find  $f(8)$ .

..... [2]

(b) Find  $h(-\frac{1}{2})$ .

..... [2]

(c) Find the value of  $x$  such that  $g(x) = 8.2$ .

..... [2]

(d) Find all values of  $x$  such that  $f(x) = g(x)$ .

..... [3]

(e) Find  $f(x-1)$ .



..... [3]

10. (i) Factorise completely the expression  $4x^2 - 18x - 10$

(ii) Solve  $4x^2 - 18x - 10 = 0$

..... [3]

..... [2]

11. (i) Write 36 and 84 as a product of prime factors.

36 = ..... [2]

84 = ..... [2]

(ii) Hence find the HCF and LCM of 36 and 84.

HCF = ..... [2]

LCM = ..... [2]

THE END