DIRECTORATE FOR QUALITY AND STANDARDS IN EDUCATION
Department for Curriculum Management and eLearning
Educational Assessment Unit
Annual Examinations for Secondary Schools 2011

A

FORM 4 **MATHEMATICS SCHEME A** **TIME: 20 minutes**
Non Calculator Paper

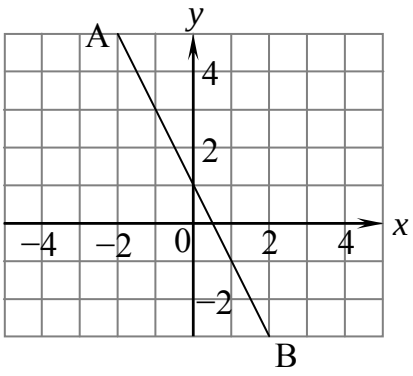
Name _____ **Class_____**

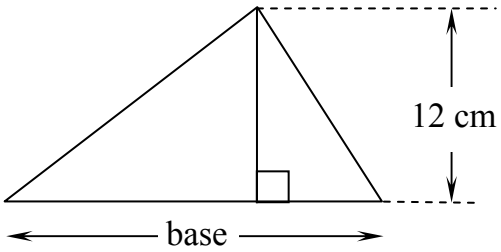
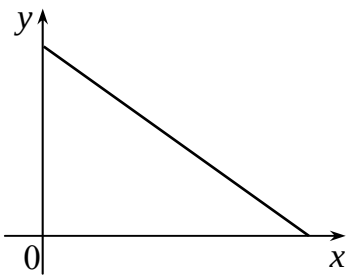
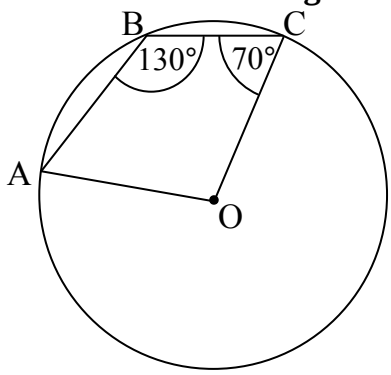
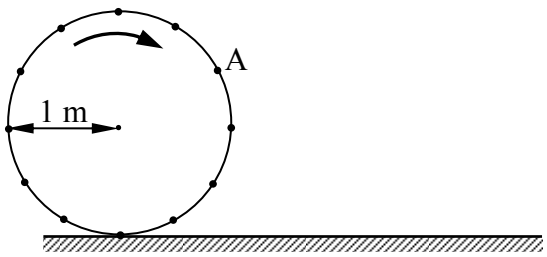
Mark

Instructions to Candidates

- **Answer all questions.**
- **This paper carries a total of 20 marks.**
- **Calculators and protractors are NOT ALLOWED.**

No.	QUESTION	Space for Working if Required
1	The locus of points which are a fixed distance from a point is: (A) a perpendicular bisector (B) a circle (C) an angle bisector (D) a regular octagon Ans:_____	
2	A point R (2, 5) is translated by $\begin{pmatrix} -6 \\ 3 \end{pmatrix}$ to a point S (a , b). Write down the values of *a* and *b*. Ans: *a* = ____ ; *b* = ____	
3	Write 2^{-3} as a **fraction**. Ans: _____	
4	**Increase** €80 by 25%. Ans: €_____	
5	Simplify: $\sqrt{\frac{100p^4}{q^2}}$ Ans:_____	
6	Express 1730 mm^2 as cm^2. Ans:_____cm^2	
7	Work out $(2{\cdot}7 \times 10^9) \times (3{\cdot}0 \times 10^{-2})$. Give your answer in **standard form**. Ans:_____	
8	Write down the equation of the line which is parallel to $y = 3x - 7$ and which cuts the *y* axis at (0, 5). Ans: _____	

9	 What is the **gradient** of the line AB? Ans:_____	
10	Expand and simplify: $(x + 3)^2$ Ans: _____	
11	Factorise completely: $3qr^2 - 27qr$ Ans: _____	
12	Work out: $55^2 - 45^2$ Ans:_____	
13	Simplify: $\frac{1}{2x} - \frac{1}{6x}$ Ans: _____	
14	Evaluate: $9^6 \div 3^{10}$ Ans:_____	
15	Make y the subject of the formula $x = \sqrt{\frac{y}{2}}$. Ans: y =_____	
16	A = $7^2 \times 5^3 \times 3$ B = $7^4 \times 5 \times 2$ What is the **Highest Common Factor** of A and B? Ans:_____	

17	The area of the triangle is 120 cm^2. Calculate the **length of the base** of this triangle.  Ans:_____cm	
18	 Which of the following could be represented by this graph? (A) The **mass** of a metal against its **volume.** (B) The **surface area** of the floor against the **number** of tiles. (C) The **distance** covered by a car against the **volume** of fuel left in the tank. (D) Converting **euro** into **US Dollars.** Ans: _____	
19	Points A, B and C lie on the circumference of a circle centre O. Calculate the **reflex angle** ∠AOC.  ° Ans:_____	
20	The points on this wheel of radius 1 m are equally spaced. The wheel turns in the direction shown. Taking 3 as an estimate for π, work out the distance the wheel covers when point A touches the ground.  Ans: _____m	

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FORM 4 **MATHEMATICS SCHEME A** **TIME: 1h 40min**
Main Paper

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	Total Main	Non Calculator	**Global Mark**
Mark																

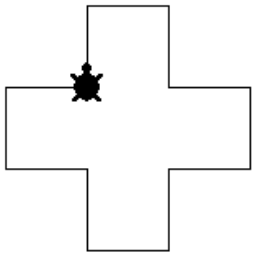
DO NOT WRITE ABOVE THIS LINE

Name: _____ **Class:** _____

CALCULATORS ARE ALLOWED BUT ALL NECESSARY WORKING MUST BE SHOWN.
ANSWER ALL QUESTIONS.

1. Complete the following logo program which traces the shape shown.

pd repeat ____ [fd 50 rt 90 fd____ rt 90 fd 50 ____ 90]



(2 Marks)

2. The volume of a sphere is 288π cm^3. Calculate the radius of this sphere.

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

Ans: _____cm

(3 Marks)

3. Solve the equation: $2x^2 + 5x - 1 = 0$, giving your answers correct to **2 decimal places**.

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

Ans: $x =$ _____ , _____

(4 Marks)

4.

a) Solve the equation: $x = \frac{3(x-4)}{2} + \frac{x}{4}$

Ans: $x =$ _____

b) Solve the equation: $8 + x(3x + 5) = 3(1 - x)$

Ans: $x =$ _____ , _____

c) Rearrange $4ab = 3ak + 1$ to make ***a*** the subject of the formula.

Ans: $a =$ _____

(9 Marks)

Name_____ Class_____ **A**

5. Gregory opened an account with Savers Bank on 1st January 2008. He put €2000 into the account to start with. He then added an extra €500 at the end of each year. The bank pays compound interest at the rate of 4% per annum.

   a) What was the **amount** on 1st January 2010?

   Ans: €_____

   b) What was the **total** interest on 1st January 2010?

   Ans: €_____

   (5 Marks)

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6. The first part of a sequence is: 7 , 11 , 15 , 19 , …

   a) Find an expression for the n^{th} term.

   Ans: n^{th} term = _____

   b) What is the 100^{th} term of the sequence?

   Ans: _____

   c) Which term of the sequence is 231?

   Ans: _____

   (6 Marks)

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7. Kimberly looked at a passage from a book she was reading. She recorded the number of words in each sentence in the frequency table shown below.

Number of words per sentence	Frequency f	Mid-values x	$f \times x$
1 − 5	17	3	51
6 − 10	27		
11 − 15	25		
16 − 20	15		
21 − 25	9	23	207
26 − 30	4		
31 − 35	0		
36 − 40	1	38	38
41 − 45	2		
	Total = 100		Total =

a) Complete the table.

b) Write down the class interval in which the median number of words lies.

Ans: _____

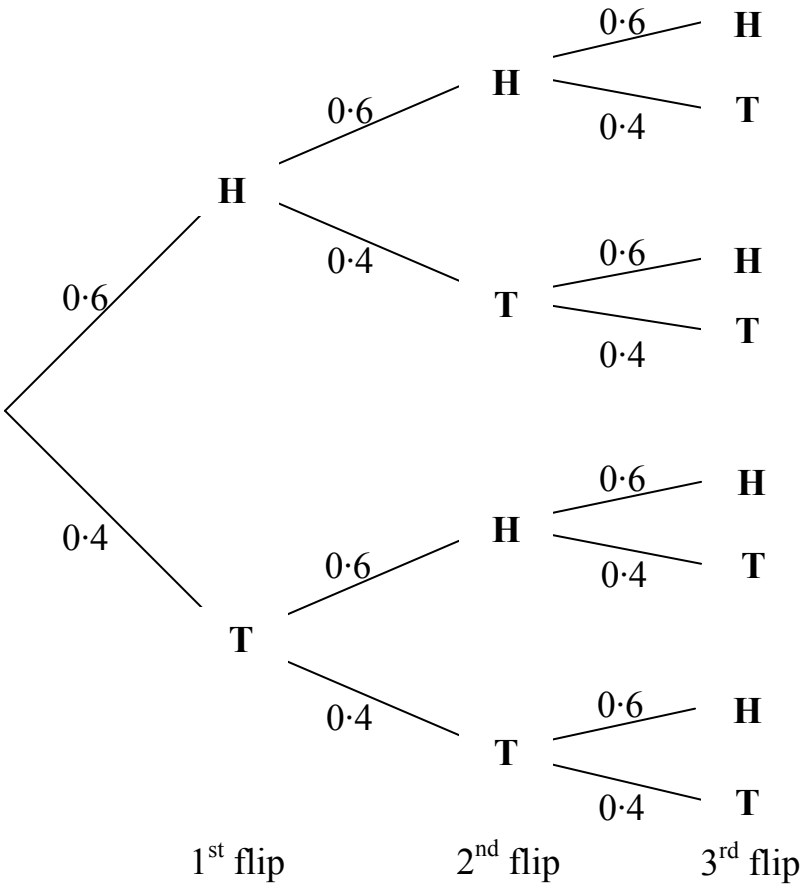
c) Work out an estimate for the mean number of words per sentence.

Ans: _____

(7 Marks)

Name_____ Class_____ **A**

8. A coin is biased. There is a 60% chance of getting Heads. You flip the coin three times.



Use the probability tree to calculate, as a **percentage**, the probability that:

a) you get three Heads.

Ans: _____%

b) you get one Head and two Tails.

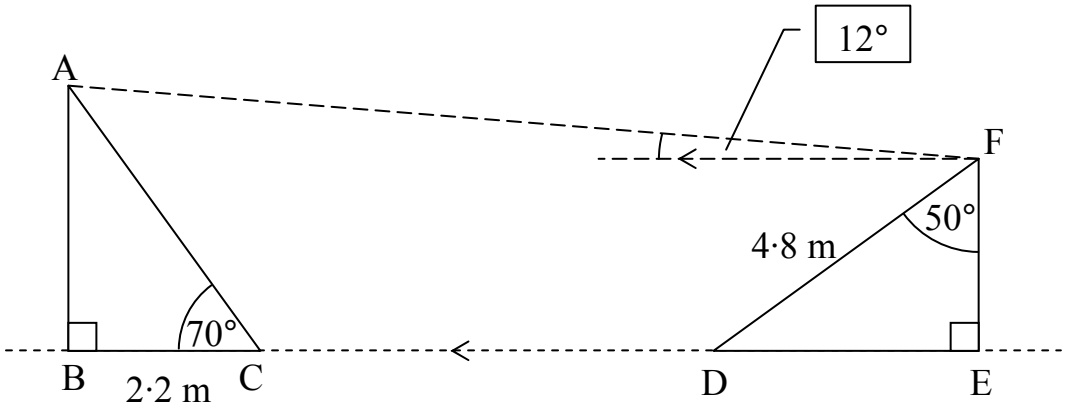
Ans: _____%

c) you get **at least** one Tail.

Ans: _____%

(6 Marks)

9.



Points B, C, D and E lie on level ground. The angle of elevation of A from F is 12°. BC = 2·2 m and FD = 4·8 m. Calculate the following distances correct to **2 decimal places**.

a) FE

Ans: FE = _____m

b) DE

Ans: DE = _____m

c) AB

Ans: AB = _____m

d) BE

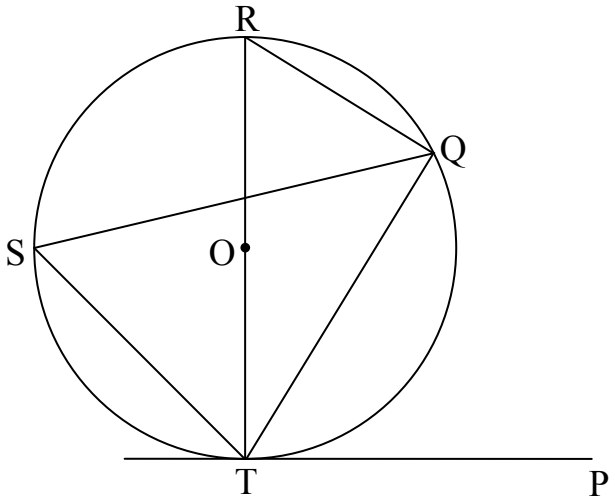
Ans: BE = _____m

e) CD

Ans: CD = _____m

(10 Marks)

10. Complete the proof to show that:
"The angle formed by a chord and a tangent at the point of contact is equal to the angle in the alternate segment".



To prove that: ∠ _____= ∠TSQ.

∠RQT = 90° _____
(Write the reason on this line)

∠QRT + ∠RTQ = _____° …(1) *Angle sum of a triangle is 180°*

∠PTQ + ∠RTQ = 90° ……(2) _____
(Write the reason on this line)

From (1) and (2)

∠QRT + ∠RTQ = ∠PTQ + ∠RTQ

Therefore ∠QRT = ∠ _____

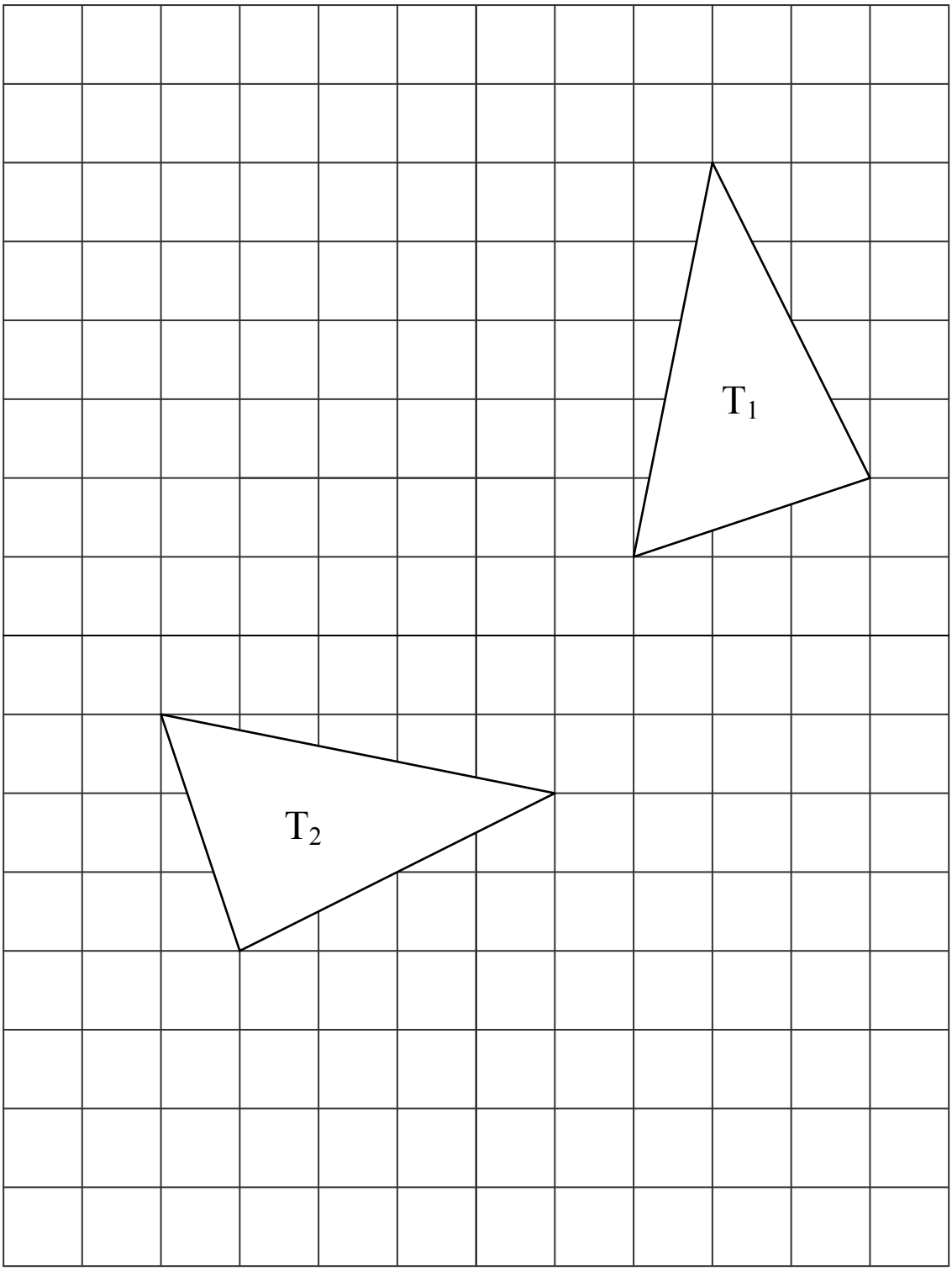
Now S is any point on the circumference.

∠TSQ = ∠ _____ *Angles in the same segment are equal*

Thus ∠_____ = ∠_____

(7 Marks)

11. T_2 is the image of T_1 after a 90° clockwise rotation about a point P. Use ruler and compasses **only** to find point P by construction. Label point P.



(4 Marks)

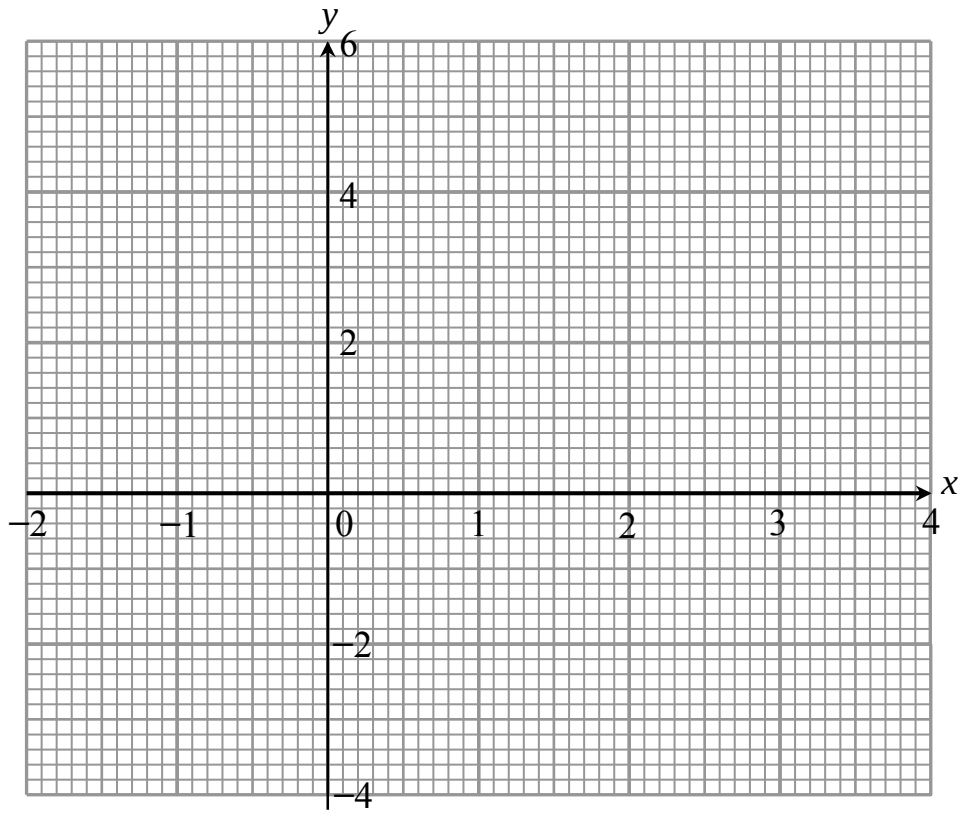
12.

a) Complete the tables below for: $y = x^2 - 2x - 2$ and $y = \frac{4-4x}{3}$

x	-2	-1	0	1	2	3	4
x^2	4	1				9	16
$-2x$	4			-2		-6	
-2	-2		-2		-2	-2	
y	6					1	

x	-2	1	4
y		0	

b) Plot the graphs of $y = x^2 - 2x - 2$ and $y = \frac{4-4x}{3}$ on the grid below.

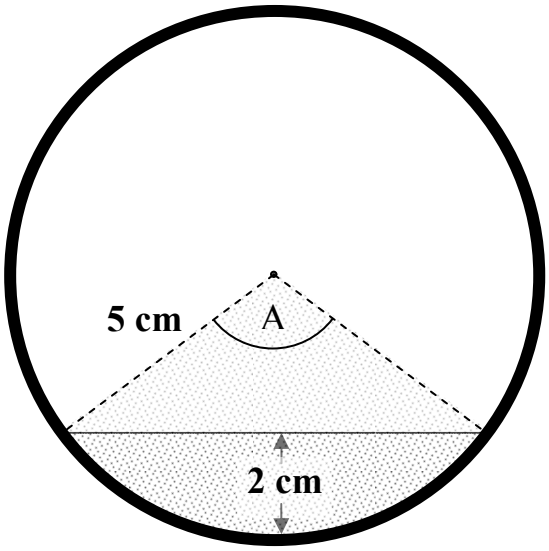


c) Use your graphs to solve the simultaneous equations $y = x^2 - 2x - 2$ and $y = \frac{4-4x}{3}$. Give the answers correct to **1 decimal place.**

Ans: $x =$ _____ , $y =$ _____ and $x =$ _____ , $y =$ _____

(8 Marks)

13.



The diagram shows a cross-section of a cylindrical water pipe of internal radius 5 cm. The water level is 2 cm at its deepest part as shown by the shaded segment.

a) Calculate, correct to 2 decimal places, the angle marked A.

Ans: A = _____ °

b) Calculate, correct to 2 decimal places**,** the area of the shaded segment.

Ans: _____cm^2

c) Water is flowing at 30 cm/s. Calculate the volume of water that passes through the pipe in one hour. Give the answer correct to the **nearest litre.**

Ans: _____litres

(9 Marks)