SECONDARY SCHOOL ANNUAL EXAMINATIONS 2009
Directorate for Quality and Standards in Education
Educational Assessment Unit

FORM 5   **MATHEMATICS SCHEME A**   **TIME: 20 minutes**
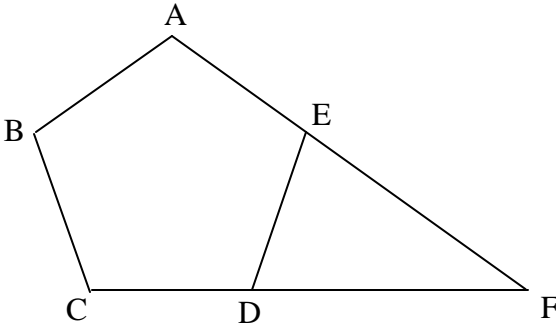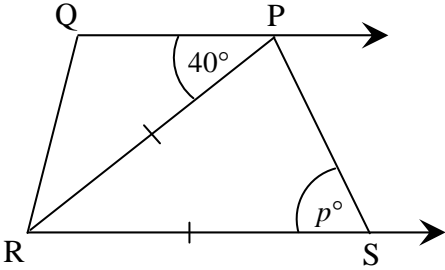**Non Calculator Paper**

Name: _____   **Class:** _____

Mark

INSTRUCTIONS TO CANDIDATES

- **Answer all questions. There are 20 questions to answer.**

- **Each question carries 1 mark.**

- **Calculators, protractors and other mathematical instruments are not allowed.**

- **You are not required to show your working. However space for working is provided if you need it.**

No.	Question	Space for Working
1	5% of a sum of money is €10. What is the sum of money? **Answer**: €_____	
2	Write 0.35 as a **fraction** in its **lowest terms**. **Answer**: _____	
3	Work out the **circumference** of a circle with a radius of 14 cm. (Take $\pi = \dfrac{22}{7}$) **Answer**: _____cm	
4	Michela changed €5 into 20 cent coins. How many coins did she get? **Answer**: _____	
5	Given that $\mathbf{4}^{x} = \mathbf{8}^{2}$, write down the value of x. **Answer**: $x =$ _____	
6	The equation of a straight line is $y = 3x - 5$. The line passes through the point $(a , -8)$. Write down the value of a. **Answer**: $a =$ _____	
7	Work out the **difference** between 20% of €73 and 20% of €23. **Answer**: €_____	
8	Given that $567 \times 23 = 13041$, write down the value of $130.41 \div 2.3$. **Answer**: _____	

No.	Question	Space for Working
9	The **mean** of five numbers is 7. Four of the numbers are 5, 7, 8 and 11. What is the other number? **Answer**: _____	
10	ABCDE is a **regular** pentagon. AE and CD are produced to meet at F. Work out the size of ∠DFE. **Answer**: _____	
11	A car was bought in 2000 for €10 000. It was sold in 2005 for €6 000. Work out the **percentage decrease** in the price of the car. **Answer**: _____%	
12	Work out: $1 - \dfrac{8}{9} \times \dfrac{3}{4}$ **Answer**: _____	
13	Write down the **smallest prime number** that is greater than 2π. **Answer**: _____	
14	A car travels a distance of 24 km in 15 minutes. Work out the **average speed** in km/h. **Answer**: _____km/h	

No.	Question	Space for Working
15	Write $\sqrt{\dfrac{9}{16}}$ as a **decimal**. **Answer**: _____	
16	The scale of a map is 1 **:** 50 000. On the map the distance between two towns is 10 cm. Work out the actual distance in **kilometres**. **Answer**: _____km	
17	In a bag there are 3 red, 5 blue and some green marbles. One marble is selected at random from the bag. The probability of selecting a red marble is one-fifth. How many **green marbles** are there in the bag? **Answer**: _____	
18	Given that $y = 2x^2 - 1$, write down the value of y when $x = -2$. **Answer**: _____	
19	Work out the value of p. **Answer**: _____	
20	€120 is shared in the ratio 3**:** 7. Work out the size of the **smaller** share. **Answer**: €_____	

SECONDARY SCHOOL ANNUAL EXAMINATIONS 2009
Directorate for Quality and Standards in Education
Educational Assessment Unit

_____

FORM 5	MATHEMATICS SCHEME A	TIME: 1h 40min
	Main Paper	

_____

1	2	3	4	5	6	7	8	9	10	11	12	13	NC	Main	Global

Name: _____   **Class:** _____

DO NOT WRITE ABOVE THIS LINE

_____

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

1. Mario is using a spreadsheet to find the **area** and **perimeter** of a **rectangle**.

	A	B	C	D
1	**Length**	**Width**	**Area**	**Perimeter**
2	12	7.5	90	39
3		7	84	38

   (a) What **formula** did Mario write in cell **D2**? =_____

   (b) What **number** did he write in cell **A3**? _____

   _____(2 marks)

2. **Factorise** completely.

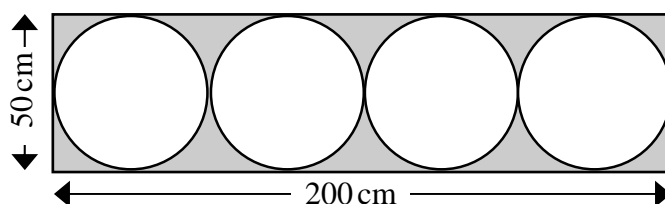   (a) $9a - 6 =$ _____   (b) $3a^2 - 2a =$ _____

   Hence **simplify**: $\dfrac{3a^2 - 2a}{9a - 6} - \dfrac{a}{6}$

   Answer: _____

   _____(4 marks)

3. Four circular pieces of metal are cut from a rectangular sheet of metal measur... by 50 cm.

50 cm

200 cm

Work out, correct to **1 decimal place**:

(a) The **area** of **one** of the circles.

(b) The **area** of metal **wasted**.

Area = _____ cm^2

Area = _____ cm^2

_____(4 marks)

4. The distance, s, moved by a body is given by the formula:

$$s = ut + \frac{1}{2}at^2$$

where u is the initial velocity, a is the acceleration and t is the time taken.

(a) Work out the value of s when $u = 12$, $a = -9.8$ and $t = 2$.

$s = $ _____

(b) Make a the subject of the formula.

$a = $ _____

_____(4 marks)

Name: _____   **Class:** _____
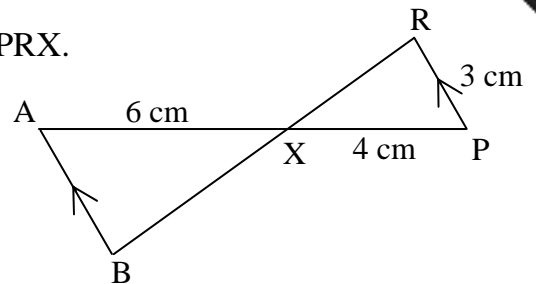
5. AP and BR intersect at X. AB is parallel to RP.
   (a) Explain why triangle ABX is **similar** to triangle PRX.

   ```
                                              R
                                             /|
                                            / | 3 cm
                          A      6 cm      /  |
                          \‾‾‾‾‾‾‾‾‾‾‾‾‾X  4 cm  P
                           \            /
                            \          /
                             \        /
                              \      /
                               \    /
                                \  /
                                 \/
                                 B
   ```
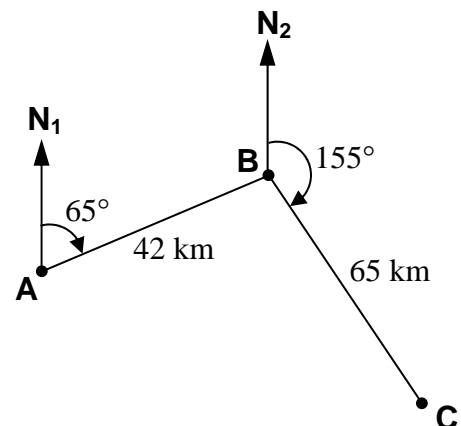
   (b) AX = 6 cm, PX = 4 cm and PR = 3 cm. Work out the **length** of **AB**.

                                              AB = _____ cm
   _____(5 marks)

6. An aircraft flies 42 km from an airfield, A, on
   a bearing of 065° to B. Then it changes course
   and flies 65 km on a bearing of 155° to C.

   (a) Show that ∠ABC = 90°.

   ```
                                    N₂
                                    ↑
              N₁                    |
              ↑             B  ) 155°
              |            /|↘
          65° |          /  | 
              ↘        42 km|
                  /         | 65 km
              A             |
                            C
   ```

   (b) Work out:

   (i) the **distance** of C from A,   (ii) the **bearing** of C **from A**,
       correct to the **nearest kilometre**.   correct to the **nearest degree**.

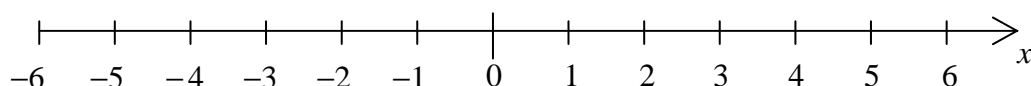   **Distance** _____ km   **Bearing** _____
   _____(7 marks)

7. For the function $f(x) = 2x + 1$:

   (a) Find $f^{-1}(x)$.

   (b) (i) Find the range of values of x for which $-6 \leq f(x) < 5$.

       (ii) Represent the solution on the number line.

       (iii) List **all** the **integers** which satisfy the inequality.

_____(7 marks)

8. (a) The weight in a packet of garden fertiliser is given as 1000 grams, correct to the
   nearest 10 grams. The packet contains a measuring cup which when full holds
   20 grams of fertiliser, correct to the **nearest 5 grams**. This cupful of fertiliser is
   recommended for every m^2 of garden treated.

   (i) Complete the following inequalities to illustrate the **lower** and **upper** bounds of
   each weight.

   _____ g ≤   weight of fertiliser in **packet**   < _____ g

   _____ g ≤   weight of fertiliser in **measuring cup** < _____ g

   (ii) Work out, correct to the nearest m^2, the **least** number of m^2 of garden that can
   be treated.
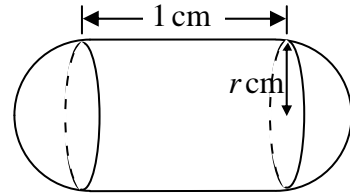
                                                                    _____ m^2

_____(4 marks)

(b) A capsule consists of a **cylinder** of length 1 cm
and radius r cm with **two hemispheres**,
also of radius r cm, at each end.

(i)   Write down a formula for the **volume**, *V*,
of the capsule, **in terms of π and r**.

$$\longleftarrow 1\,\text{cm} \longrightarrow$$
$$r\,\text{cm}$$

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

(ii)   The volume of the capsule is $1.5\,\text{cm}^{3}$. **Show** that *r* must satisfy the equation
$4\pi r^{3} + 3\pi r^{2} = 4.5$.

(iii) Use a method of trial and improvement to find the value of *r*, giving your answer
correct to **2 decimal places**.

You can use the table below to help you.

| Value of r	$4\pi r^{3} + 3\pi r^{2}$	Conclusion
1	21.991	Too large. Try a smaller number.
0.5	3.927	Too small. The solution must lie between 1 and 0.5.

r = _____ cm

_____(5 marks)

9. The diagram shows the outline of a town. There are three supermarkets A, B and C located as shown on the diagram. There is also a school, S, which is located **halfway** along the straight road joining A to C.

B is 8 km from A and 10 km from C.

C is 12 km from A.
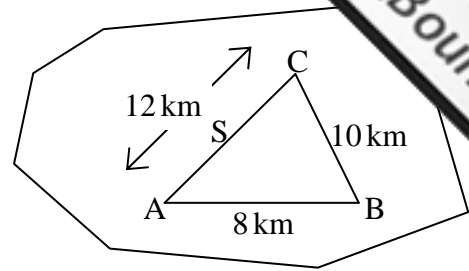
Use ruler and compasses only to answer the following questions.
All construction lines and arcs must be shown.

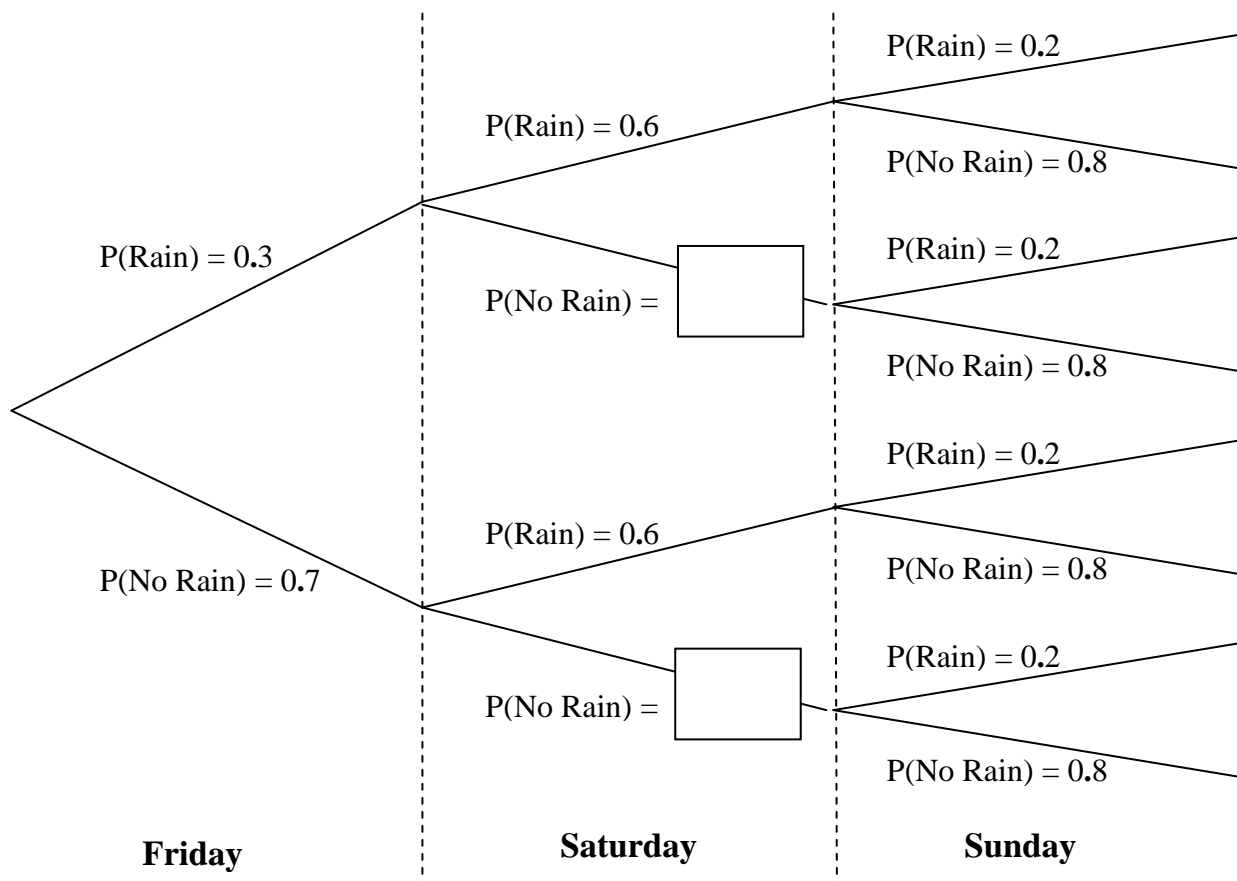(a) Make a **scale** drawing of triangle ABC and mark the **exact** position of S. Use a scale of 1 cm to 1 km.

A
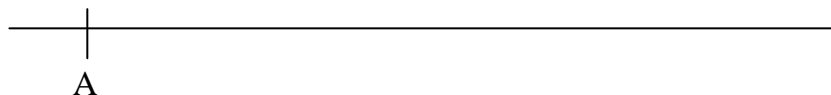
(b) Construct the locus of points equidistant from:

(i) A and B   (ii) B and C

(c) A married couple want to buy a house in the town. They want **B** to be the **nearest** supermarket. They would also like to be **within 3 km** of the school.

Show by **shading**, on the scale drawing, the area of the town where the house could be ideally located to meet the above requirements.

_____(7 marks)

10. Thomas is going abroad for a long weekend.
He checks the three day weather forecast at
his destination on the internet.
The table gives the chance of precipitation
(rain) for the three days.

CHANCE OF RAIN		
Friday	Saturday	Sunday
30%	60%	20%

(a) Complete the probability tree diagram to show all the possible outcomes.

P(Rain) = 0.3

P(No Rain) = 0.7

P(Rain) = 0.6

P(No Rain) =

P(Rain) = 0.6

P(No Rain) =

P(Rain) = 0.2

P(No Rain) = 0.8

P(Rain) = 0.2

P(No Rain) = 0.8

P(Rain) = 0.2

P(No Rain) = 0.8

P(Rain) = 0.2

P(No Rain) = 0.8

Friday   **Saturday**   **Sunday**

(b) Work out the probability that:

(i)   It rains on **all 3 days**.

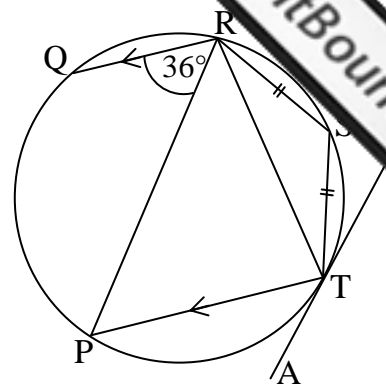(ii) It rains on **only 2 days**.

(iii) It rains on **at least 1 day**.

(8 marks)

11. (a) P, Q, R, S and T are points on the circumference
of a circle. ATB is a tangent to the circle at T.

RS = ST and PT is parallel to QR. ∠PRQ = 36°.

**Show all your working and give reasons for your
answers.**

Work out the size of:

(i) ∠RST

(ii) ∠BTS

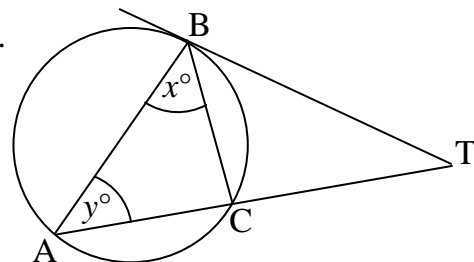- -

(b) In the diagram BT is a tangent to the circle ABC.
ACT is a straight line.
∠ABC = ∠ATB.

Prove that AB is a **diameter** to the circle.
Give reasons for your answers.

_____(8 marks)

12. An athletics coach needs to choose a small group of athletes to compete in an
international athletics meeting for youths. A group of 40 girls from schools in Malta
take part in a Long Jump competition.
The diagram on the next page shows the cumulative frequency curves for
the distances achieved by the girls **before** and **after** an extensive period of training.
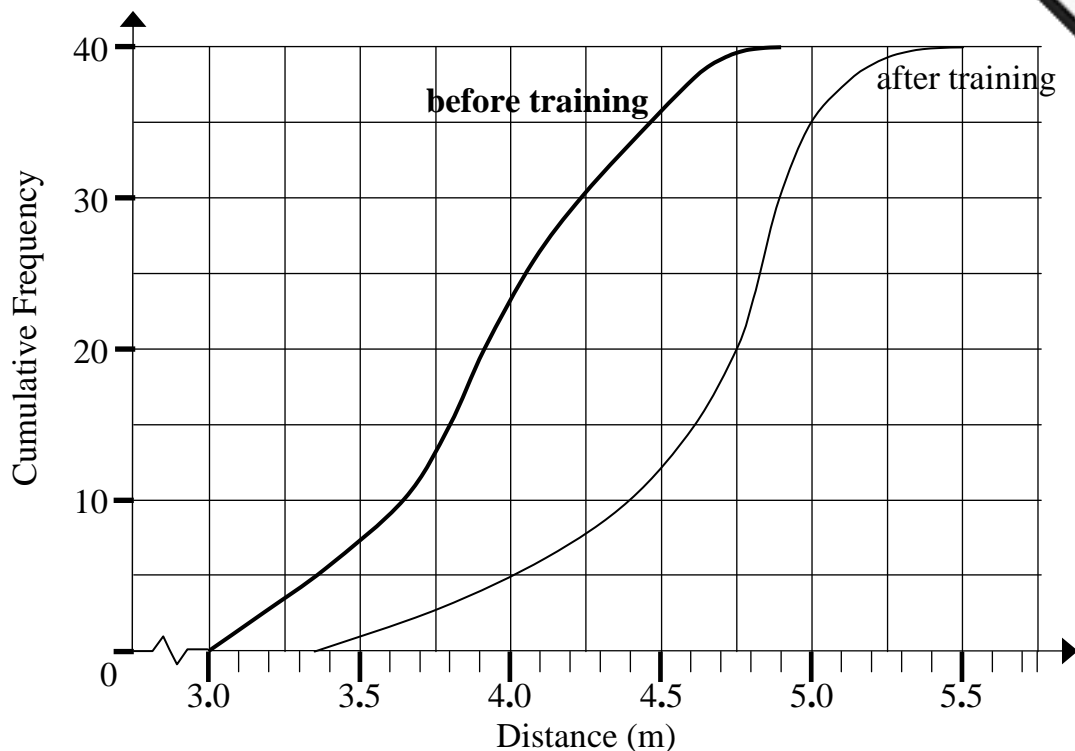
(a) For each curve write down an estimate for the **median** distance jumped.

    (i) **before** training _____ m   (ii) **after** training _____ m

(b) For each curve write down an estimate for the **interquartile range**.

    (i) **before** training _____ m   (ii) **after** training _____ m

(c) "Most of the girls improved their performance after the training."
Do you agree with this statement? **Give reasons**.

(d) The coach decides to continue the training programme with those athletes who
jumped **more than 5.0 m after** the training.
How many girls continued with the training programme?

(e) Lara jumped **4.0 m before** the training. She missed the competition **after** the
training as she was ill. It is likely that Lara's place in the order would be about the
same. Based on her performance before the training, give an estimate for the
distance Lara would have jumped **after** the training.
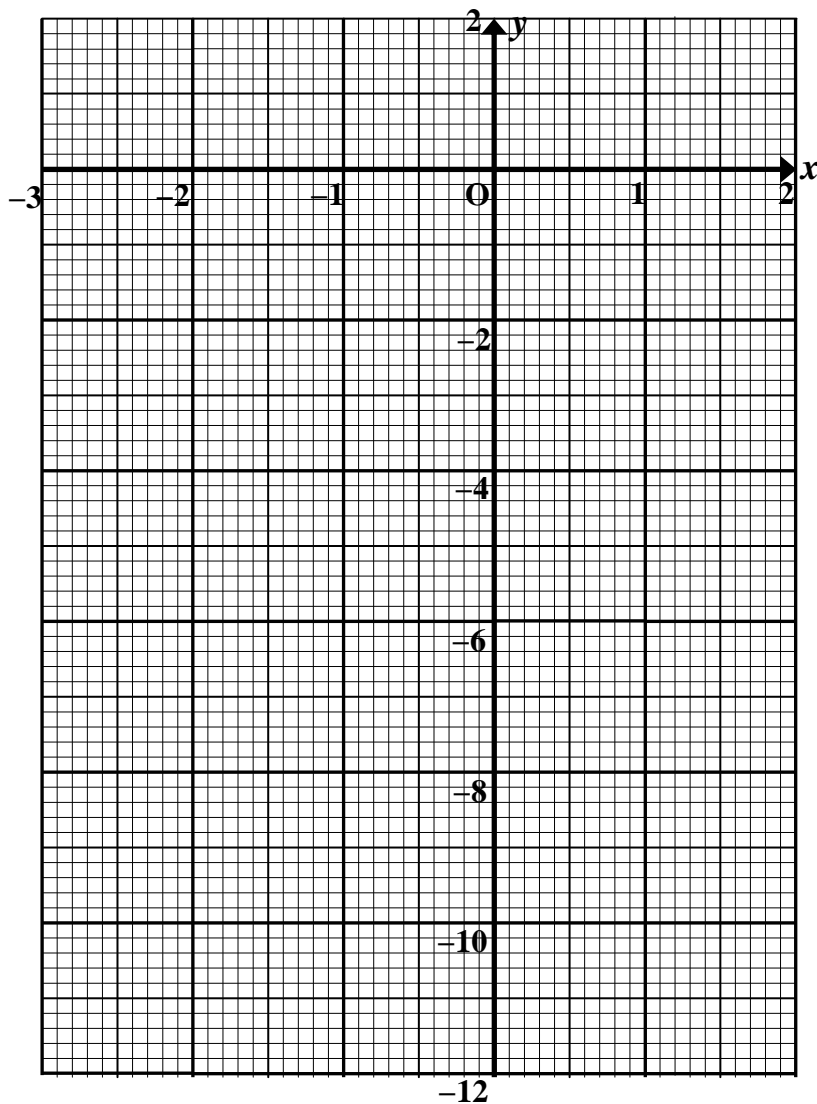
                                    _____ m

(7 marks)

13. (a) Complete the table for $y = 1 - 2x - 2x^2$ for the given values of x.

x	-3	-2	-1	0		
1	1	1	1	1	1	1
$-2x$	6	4	2	0	-2	
$-2x^2$		-8	-2	0		-8
y		-3	1	1		

(b) Draw the graph of $y = 1 - 2x - 2x^2$ using the scale and axes given on the grid.

(c) Use your graph to solve $3 - 2x - 2x^2 = 0$, correct to 1 decimal place.

(d) Use your graph to solve $1 - 4x - 4x^2 = 0$, correct to 1 decimal place.

_____(8 marks)

END OF PAPER