

Annual Examinations for Secondary Schools 2015

FORM 5

MATHEMATICS TRACK 3
Non Calculator Paper

TIME: 20 minutes

Name: _____

Class: _____

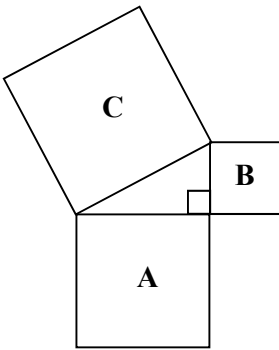
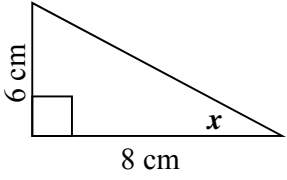
Mark

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	Work out 38×1000 giving your answer in standard form . _____	
2	Find the cost of 48 books at €9.99 each. € _____	
3	Given that $f(x) = 3x^2$, write down the value of $f(-2)$. _____	
4	The area of a rectangular room is 28 m^2 . What length and width can the room have? Length = _____ m Width = _____ m	
5	Work out the simple interest on €5000 at 4% per annum for 2 years. Interest = € _____	
6	Underline the value of $(-1)^{43}$. A. -1 B. 1 C. -43 D. 43	
7	5% of a sum of money is €150. What is 40% of the sum of money? € _____	
8	If $654 \times 321 = 209\,934$, write down the value of $209.934 \div 3.21$. _____	
9	The circumference of a circle is 54 cm. Underline the best estimate for the radius of the circle. A. 18 cm B. 9 cm C. 6 cm D. 3 cm	

No.	Question	Space for Working
10	Work out. $\sqrt[3]{\frac{2}{3} \times \frac{3}{16}}$ _____	
11	Write the next term in the sequence: 27, 9, 3, 1, ... _____	
12	Evaluate. $10^4 \times 0.01$ _____	
13	Given that $a = \sqrt{b^2 - c^2}$, find the value of a when $b = -5$ and $c = 4$. $a =$ _____	
14	11 trees are planted at equal intervals in a straight line. The distance from the first tree to the third tree is 10 metres. What is the distance from the first to the last? _____ metres	
15	Write down the cube of -3 . _____	
16	Work out, giving your answer in its lowest terms . $\frac{9}{20} \div \frac{3}{4}$ _____	
17	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 between the two towns in km . _____ km	

No.	Question	Space for Working
18	Work out. $999^2 - 1$ _____	
19	<p>Three squares are drawn on the sides of a right-angled triangle. The area of square C is 289 cm^2 and the area of square A is 225 cm^2. Work out the length of one side of square B.</p>  _____ cm	
20	<p>Work out.</p> $\cos x - \sin x$ <p>Give your answer as a fraction.</p> _____	



Annual Examinations for Secondary Schools 2015

FORM 5

MATHEMATICS TRACK 3

TIME: 1h 40min

Main paper

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

Name: _____

Class: _____

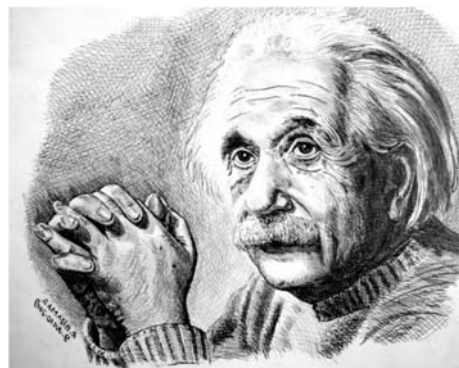
**Calculators are allowed but the necessary working must be shown.
 Answer all questions.**

1 (a) **Factorise:** $2p^2 - pq$.

(b) Hence **simplify:** $\frac{2p^2 - pq}{pq}$

2 marks

2 Einstein's famous formula states that $E = mc^2$.
 Work out the value of E given that $m = 1.5 \times 10^{-3}$
 and $c = 2.5 \times 10^7$. Give your answer in **standard form**.



Albert Einstein (1879-1955)

$E =$ _____

3 marks

3 When a dealer sells a tablet for €560, she makes a profit of 12%.

(a) Work out the **profit**, in euro.



Profit = € _____

(b) The dealer wants to make a profit of 15%. How much should she sell the tablet for?

Selling price = € _____

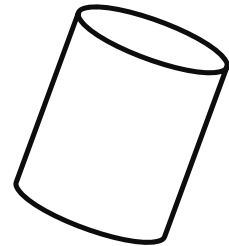
5 marks

4 To find the **volume** of a cylinder *multiply π by the square of the radius and by its height.*

(a) Let V represent the volume, r the radius and h the height of the cylinder. Write a **formula** for V in terms of π , r and h .

$V =$ _____

(b) Work out the **volume** of the cylinder given that its diameter is 11 cm and its height is 18 cm. Give your answer correct to **two decimal places**.



Volume = _____ cm^3

(c) Make r the **subject** of the formula.

$r =$ _____

6 marks

Name: _____

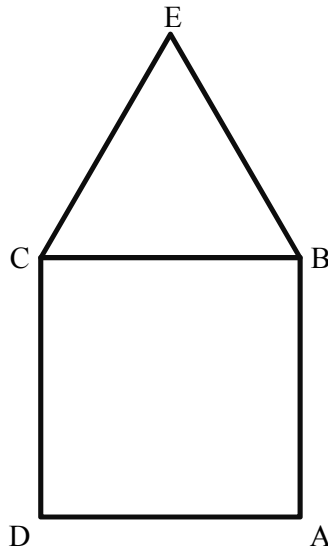
Class: _____



Track 3

5 ABCD is a **square** and CBE is an **equilateral triangle**.

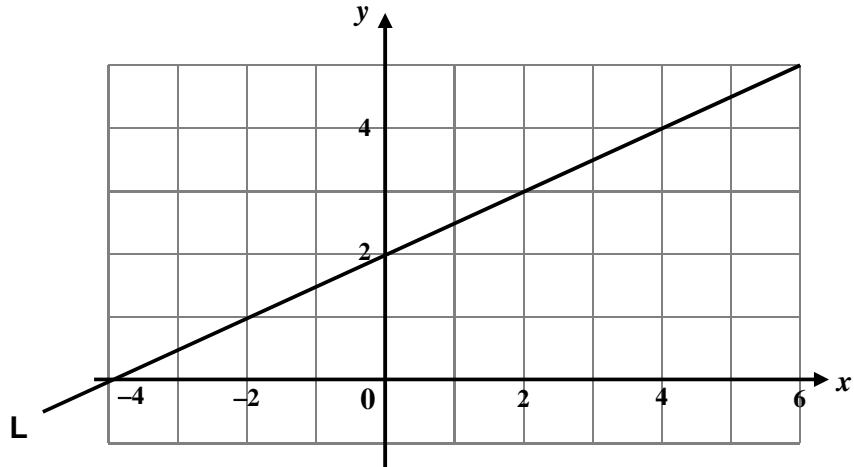
(a) Explain why $\angle ABE = 150^\circ$.



(b) Prove that the triangles DCE and ABE are **congruent**.

6 marks

- 6 The diagram below shows the graph of a straight line, **L**.



- (a) Work out the **gradient** of the **line L**.

Gradient = _____

- (b) Write down the **equation** of the **line L**. _____

- (c) Another straight line, **M**, is **parallel** to line **L** and passes through (0, 6).
Write down the **equation** of this **line M**.

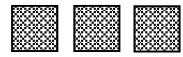
- (d) The line $x = 10$ intersects the line **L** at the point P.
Write down the coordinates of P.

P (____ , ____)

8 marks

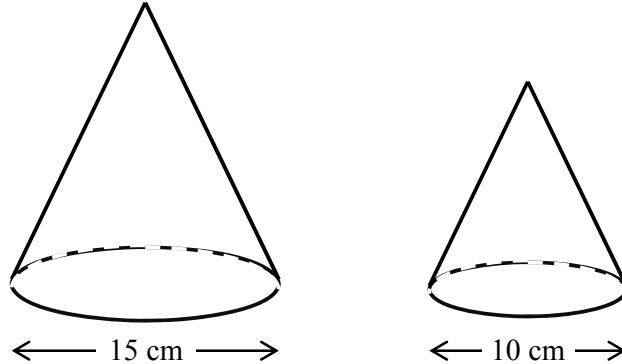
Name: _____

Class: _____



Track 3

- 7 The diameters of two **similar** cones are 15 cm and 10 cm.



- (a) Write down the **ratio** of the **heights** of the cones in the form $a : b$ where a and b are both **integers**. **Simplify** your answer.

ratio of heights = _____ : _____

- (b) Write down the **ratio** of the **volumes** of the cones in the form $p : q$, where p and q are both **integers**. **Simplify** your answer.

ratio of volumes = _____ : _____

- (c) The volume of the smaller cone is 320 cm^3 . Work out the **volume** of the **larger cone**.

Volume = _____ cm^3

6 marks

- 8 The force of attraction, F , between two magnets varies **inversely** as the **square** of the distance, d , between them. When the distance between the two magnets is 2 metres, the force of attraction is 18 newtons.

(a) Write a **formula** for F in terms of d . (Use k for the constant of proportion.)

$$F = \underline{\hspace{2cm}} \text{ newtons}$$

(b) Work out the **distance** between the two magnets when the attractive force is 8 newtons.

$$d = \underline{\hspace{2cm}} \text{ metres}$$

6 marks

- 9 (a) Solve the equations $x^2 - 4y^2 = 0$
 $x + 2y = 6$

$$x = \underline{\hspace{1cm}}, y = \underline{\hspace{1cm}}$$

(b) The solutions of a quadratic equation are $x = -2$ and $x = 3$. Write down the quadratic equation in the form $ax^2 + bx + c = 0$.

8 marks

10 (a) Work out the **difference** between $\frac{1}{4}$ and $\frac{1}{5}$.

(b) **Multiply** $\frac{1}{4}$ by $\frac{1}{5}$.

(c) What do you notice about the answers of (a) and (b)?

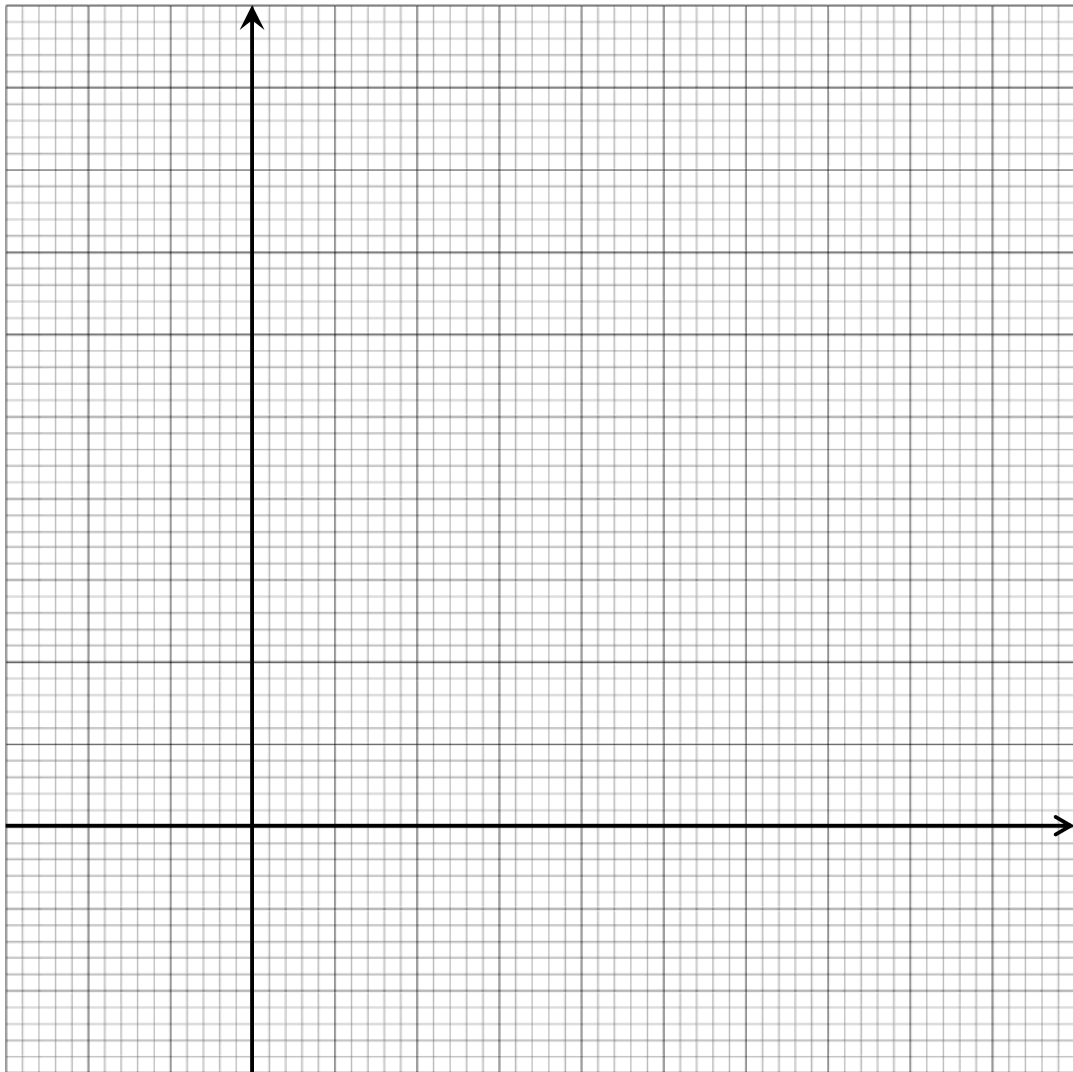
(d) Show that the **difference** and **product** of the two fractions $\frac{1}{a}$ and $\frac{1}{a+1}$ are equal.

6 marks

- 11 (a) Complete the following table for $y = x^3 - 2x^2$.

x	-1	-0.5	0	1	2	2.5	3
x^3			0	1	8		27
$-2x^2$			0	-2	-8		-18
y			0	-1	0		9

- (b) Use this table to draw the graph of $y = x^3 - 2x^2$ for values of x from -1 to 3.



- (c) Using the same scale and axes draw the graph of $y = 2x - 1$.
- (d) Write the values of x at the **points of intersection** of the two graphs.

$x = \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}$

11 (e) Write down the **equation** whose solutions are the answers to part (iv).

9 marks

12 The function f is defined as $f(x) = \frac{k}{x-3}$.

(a) Given that $f(5) = 6$, work out the value of k .

$$k = \underline{\hspace{2cm}}$$

(b) Work out the value of x given that $f(x) = 1.5$.

$$x = \underline{\hspace{2cm}}$$

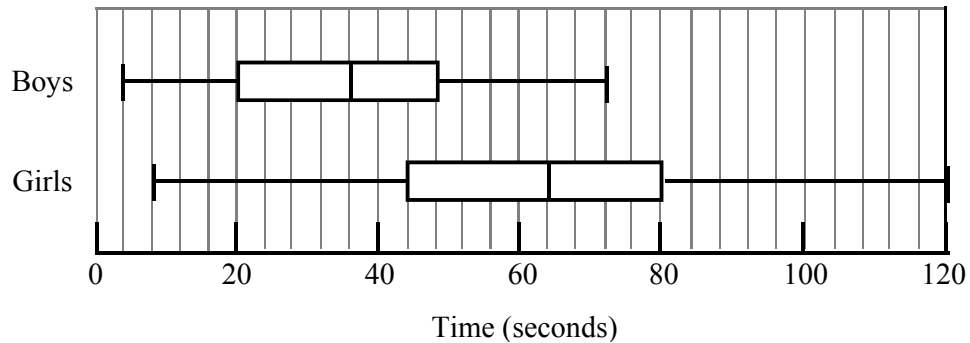
(c) (i) Find $f^{-1}(x)$

$$f^{-1}(x) = \underline{\hspace{2cm}}$$

(ii) Hence **simplify** the expression $\frac{f^{-1}}{x^2-16}$.

8 marks

- 13 The **box plots** below represent the time, in seconds, which a sample of children spent using their mobile phones during one day.



- (a) Use the box plots to complete the table below.

	Boys	Girls
Lower Quartile	20	
Median		
Upper Quartile		80
Interquartile Range		

- (b) Use this information to compare the times spent by the boys and the girls using their mobile phones.

7 marks

END OF PAPER