First Name	
Last Name	
Date	
Total Marks	/ 100 marks

MathsMadeEasy

GCSE Mathematics

Non-Calculator
Higher Tier
Free Practice Set 5
1 hour 45 minutes

Answers at:
http://www.mathsmadeeasy.co.uk/gcsemathspapers-free.htm

Instructions

Write your name and other details in the boxes above.
Answer all the questions
Take π to be 3.142

Information

Marks are shown in brackets for each question (2)
Calculators may not be used

Advice

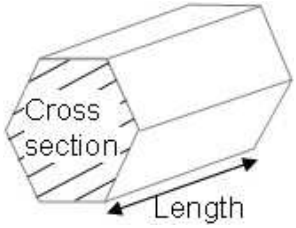
Don't spend too long on one question
Show all your working in calculations for full marks
You will get marks for method even if your answer is incorrect
Leave a question until later it you cannot answer it

Materials needed for examination

Ruler marked in centimetres and millimetres,
protractor, compasses, pen, pencil, rubber
Tracing paper may be used

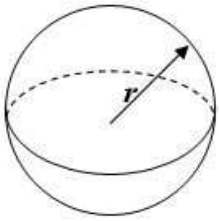
Formulae sheet — Higher tier

Volume of prism = area of cross-section × length



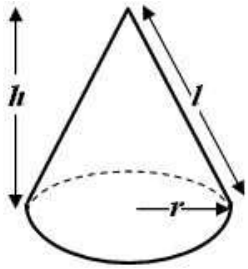
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

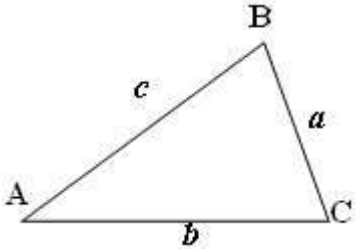
Curved surface area of cone = πrl



In any triangle *ABC*

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

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



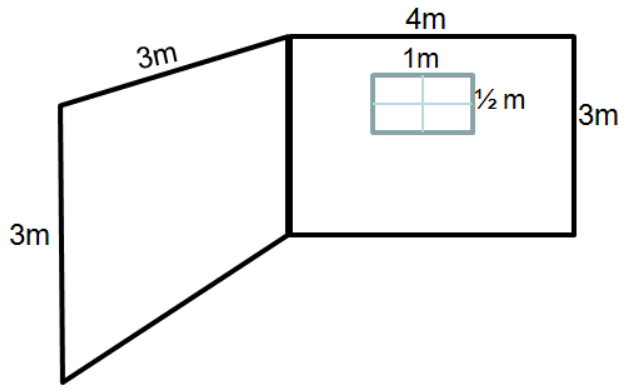
Area of a triangle = $\frac{1}{2}ab\sin C$

The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Authors Note

1. Two walls of a bathroom need tiling. The walls are shown below.



not drawn accurately

One wall is 3 metres by 3 metres.
The other wall is 3 metres by 4 metres with a window which is 1 metre by ½ metre.

Work out the area that needs tiling.

..... m^2 **(3)**

Tiles are squares measuring 25cm by 25 cm. They cost £3.00 each
Calculate the costs of tiling the bathroom

£..... **(3)**

2. a) Expand $y\,(y - 5)$

..... **(2)**

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

..... **(2)**

c) Simplify $10a^2 - 6b - 3a^2 + 3b - b$

..... **(1)**

d) Factorise $9x^2 - 4$

..... **(2)**

e) Solve $21a^2 + 5a = 4$

a = ... **(3)**

3. Given that

$543 \times 21 = 11403$

find the value of

a) 54.3×2.1

..... **(1)**

b) 0.543×0.21

..... **(1)**

c) $1140.3 \div 5.43$

..... **(1)**

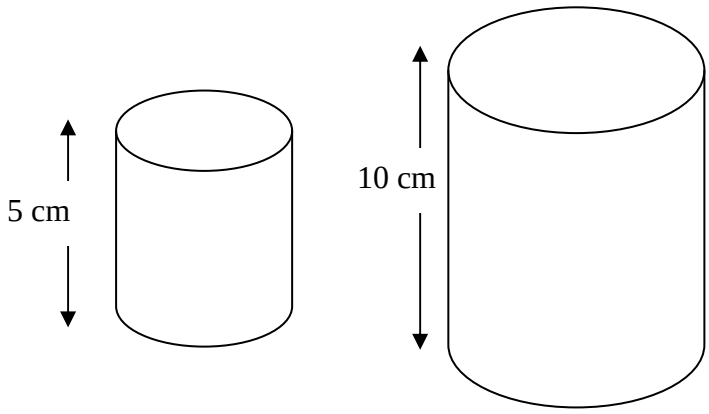
4. For a qualification $\frac{2}{5}$ of the marks were given for coursework.

The *rest* of the marks were given for a written paper of which $\frac{3}{8}$ were given for a mental test.

Total marks were out of 120.
How many marks were given for the mental test.

..... **(3)**

5. Two mathematically similar cylinders are shown



Diagrams NOT Drawn accurately

The volume of the smaller cylinder is 50 cm^3
Calculate the volume of the larger cylinder.

……cm^3 **(3)**

6. Cyril had a pack of playing cards.

Each card in the pack is green or blue with a circle, square, triangle or rectangle symbol. The table below shows the probability of picking different cards.

Symbol	Circle	Square	Triangle	Rectangle
Colour	Green	Green	Blue	Blue
Probability of picking a card	$2x$	x	$3x$	$5x$

Cyril picked **two** cards at random without replacement

a) What is the probability of picking a blue card *and* a green card.

..... **(3)**

Cyril put the cards back, then picked **two** cards at random without replacement

b) What is the probability of **not** picking a card with the square symbol

..... **(3)**

A bag contained some blue and green balls.
Two balls are picked at random without replacement

The probability of picking a blue ball on the first selection is $\frac{x}{10}$

The probability of picking *two blue* balls is $\frac{1}{15}$

How many blue balls were in the bag

..... **(4)**

7. What is the LCM of 420 and 540

(2)

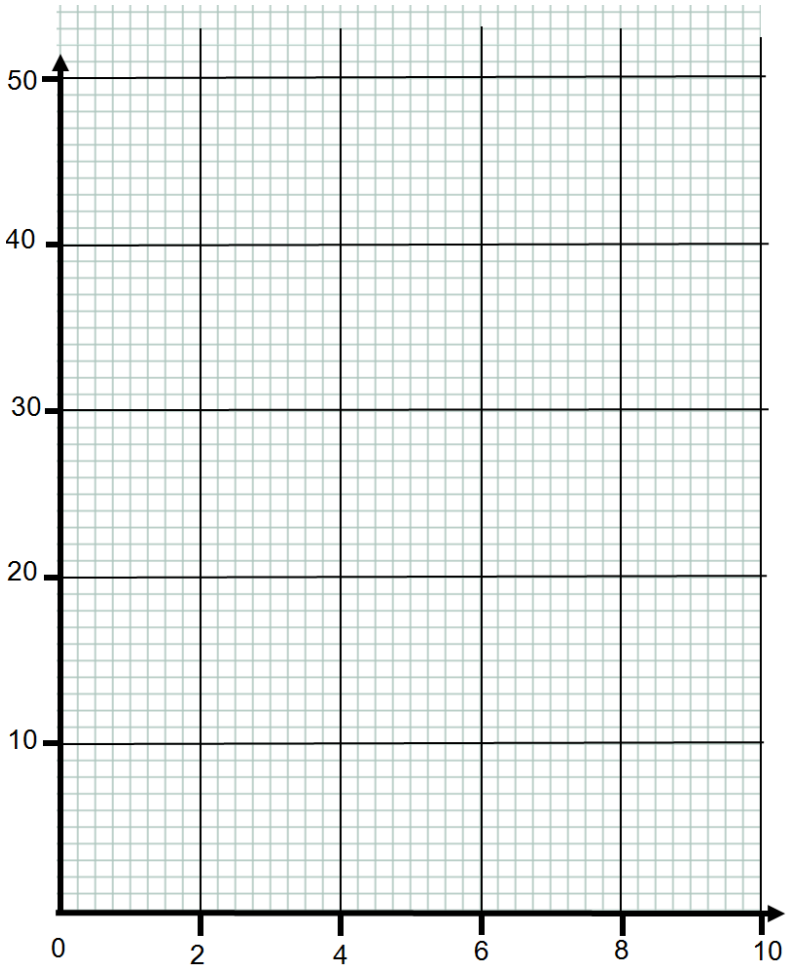
.....

8. Bill had an internet business selling socks.
He starts by charging £5.00 for each pair plus postage of £3 for each order.

a) On the graph below plot the equation

$$y = 5x + 3$$

(2)



b) Bill reduced the price for a pair of socks to £4, but increased postage to £6.
On the same graph plot the equation showing this information.

Use the graph to compare both offers and work out for how many pairs of socks the two offers charge the same.

.....

(2)

9. Matt's looked at his yearly income statement and noticed some values were missing.

Yearly income report: Matt M. Easy

Employee No: 123456 Tax Code: 747L

	Gross pay	£ 2 3 0 0 0. 0 0
a)	Taxable Pay	£ ....
b)	Income Tax	£ ....
	NI	£ 1 8 9 2 .6 4
c)	Total Deductions	£ ....
d)	Net Pay	£ ....

His taxable pay is worked out using the tax code 747L.
747L means, he is doesn't have to pay tax on £7475 of his gross pay.

Use the following formula to complete Matt's income statement

a) Taxable Pay = Gross Pay – £7475.
Work out Matt's Taxable Pay and enter it above. **(1)**

b) Matt's Income tax is 20% of his Taxable Pay.
Work out Matt's Income tax and enter it above. **(1)**

c) Matt's Total Deductions = Income Tax + NI (national Insurance)
Work out Matt's Total Deductions and enter it above. **(1)**

d) Net Pay = Gross pay – Total deductions.
Work out Matt's Net Pay and enter it above. **(1)**

10. Peter made some bricklaying mortars using the proportions:
1 part cement
¼ part lime
3 parts sand

He made 34 kg of mortar.

Work out the proportions for each

Cement ..... kg
Lime ..... kg
Sand ..... kg **(3)**

11. The formula

$$v^2 = u^2 + 2as$$

gives the velocity v of an object dropped from a height.

u is the starting velocity of an object
v is the final velocity of an object
a is the acceleration due to gravity. a = 9.8 on Earth.
s is the height dropped in metres.

a) An object is dropped from rest and reaches a final velocity of 10m/s
Calculate the height dropped
Give your answer to 1 decimal place.

s = ...m **(2)**

Another object has an initial velocity of 20 m/s and falls 25m
u = 20m/s
s = 25m

b) Calculate the final velocity v
Give your answer to 1 decimal place.

v = ...m/s **(2)**

12. Chantelle wants to buy ***two pairs*** of trainers.
Three shops sell the trainers she wants as shown below.

DW Shoes	**CB Sports**	**Joggers**
Trainers	Trainers	Trainers
Normal price £40	Normal price £38	Normal price £43
$\frac{1}{5}$ th off	15% off	Buy one pair get 2nd pair Half price

Calculate which shop is the cheapest for *two pairs* of trainers.
Show all your working

Cheapest Shop is ..... **(4)**

13. a) Make y the subject of the formula

$$y + 3x = \frac{2y}{x}$$

..... **(2)**

b) Simplify $\frac{6\ x^3\ y^5}{3x^2\ y^6}$

..... **(2)**

c) Simplify $\frac{2x^2 + 7x - 15}{x^2 + x - 20}$

..... **(4)**

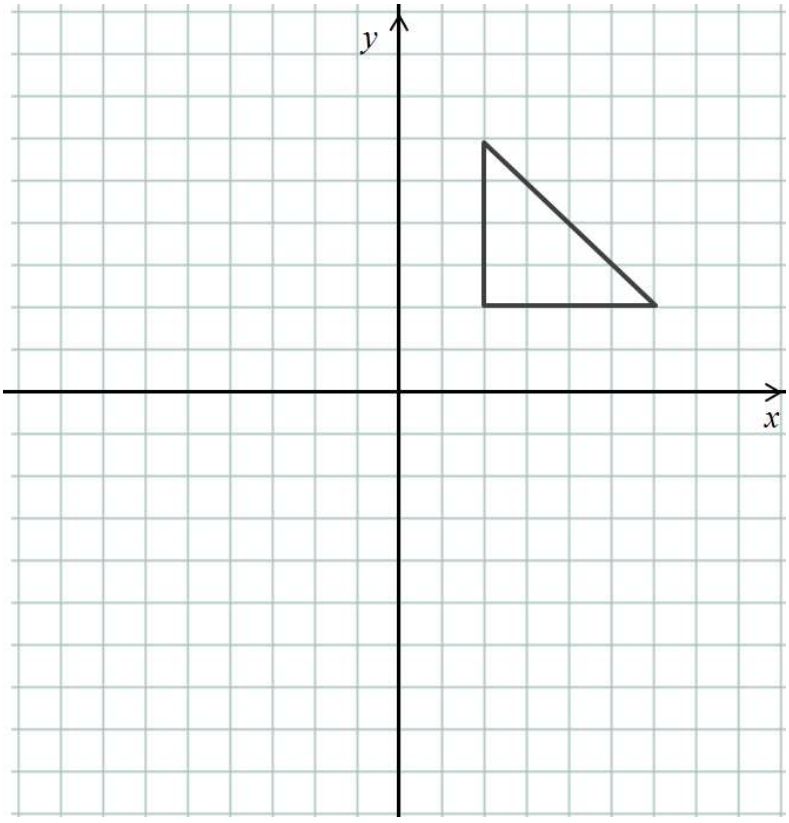
d) Solve the simultaneous equations

$x^2 + y^2 = 25$
$y = x - 1$

x = ... **(3)**

y = ...

14. Enlarge triangle **A** by scale factor of –1 ½ , centre *O*. **(3)**



15. The sale price for a coat was £108.
The normal price was reduced by 20%.

Work out the normal price for the coat.

£.....

(3)

16. Given that $x^2 - 8x - 4 = (x - a)^2 + b$ find a and b

a = ... b =.....

(3)

Hence solve $x^2 - 8x - 4 = 0$
Give your answer in the form $c \pm d\sqrt{5}$

x =.....

(3)

17. The amount of energy (E) released when matter is converted to energy is proportional to mass of that object (m).

When $E = 9 \times 10^{13}$ Joules, $m = 1 \times 10^{-3}$ kg

a) Find a formula for E in terms of m giving your answer in standard form

E = ...

(3)

b) Calculate the mass, in kg when $E = 1.8 \times 10^{15}$ Joules
Give your answer in standard form

E = ...kg

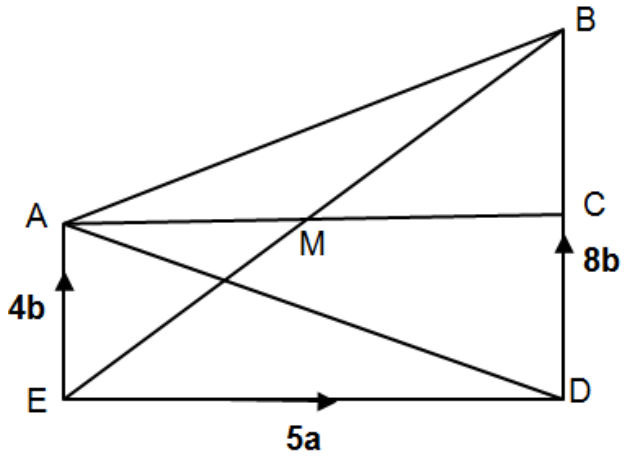
(2)

c) Calculate the Energy, in joules when m = 0.00000015 kg
Give your answer in standard form

m = ...Joules.

(1)

18. ACDE is a rectangle with $\overrightarrow{AE}$ = **4b**, $\overrightarrow{ED}$ = **5a and** $\overrightarrow{DB}$ = **8b**
M is the midpoint of AC
ABC is a right angled triangle



Write each of the following vectors in terms of a and b

a) $\overrightarrow{BA}$

..... **(1)**

b) $\overrightarrow{BM}$

..... **(1)**

c) Show that M is the midpoint of the line BE

(2)

19. A survey of 100 trainee teachers was made to see how long they spent revising for their QTS numeracy test

The table below shows how long in hours the trainee teachers spent.

Time (t hours)	Frequency
$0 \leq t < 4$	8
$4 \leq t < 8$	23
$8 \leq t < 12$	37
$12 \leq t < 16$	25
$16 \leq t < 20$	7

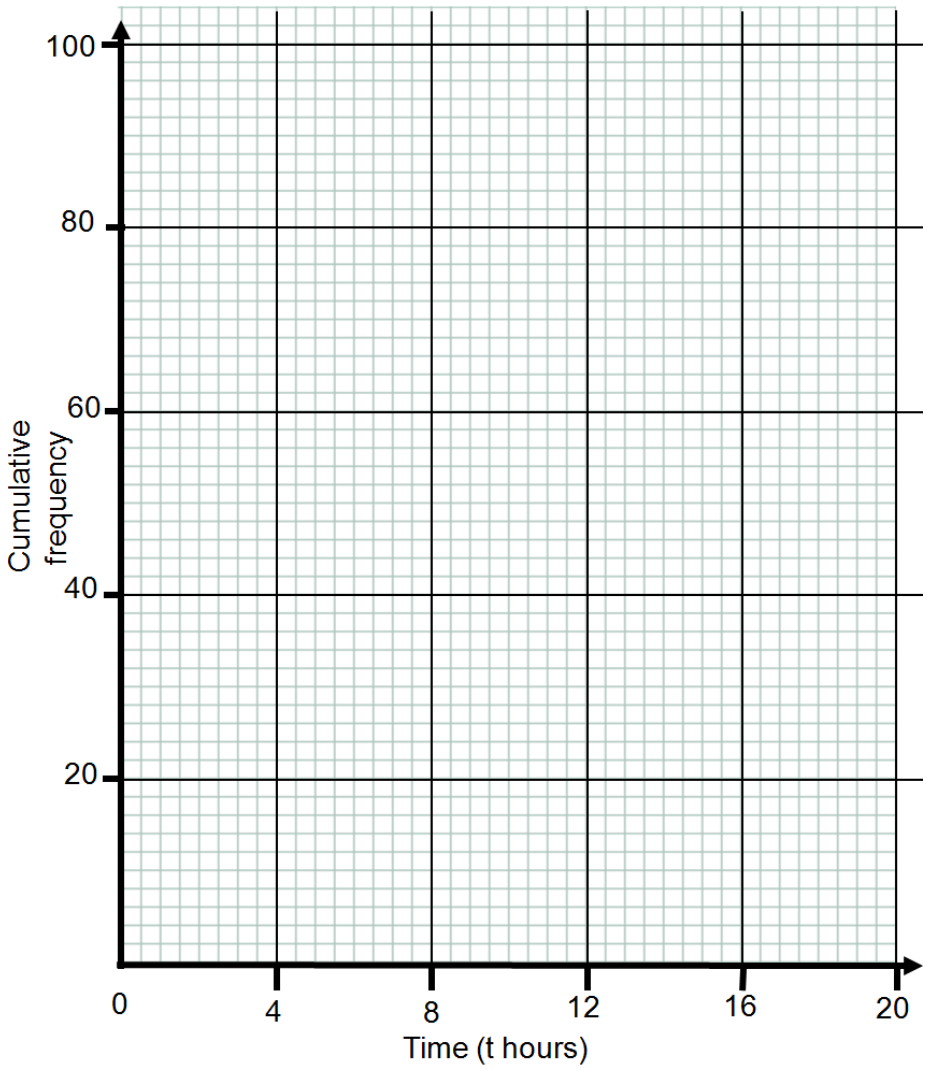
a) Complete the cumulative frequency table **(1)**

Time (t hours)	Cumulative Frequency
$0 \leq t < 4$	8
$0 \leq t < 8$	
$0 \leq t < 12$	
$0 \leq t < 16$	
$0 \leq t < 20$	

b) Using your completed table draw a cumulative frequency graph on the grid **(2)**

c) One quarter of the trainee teachers *spent x hours or more* revising.
Using the cumulative frequency graph estimate the value of *x*.

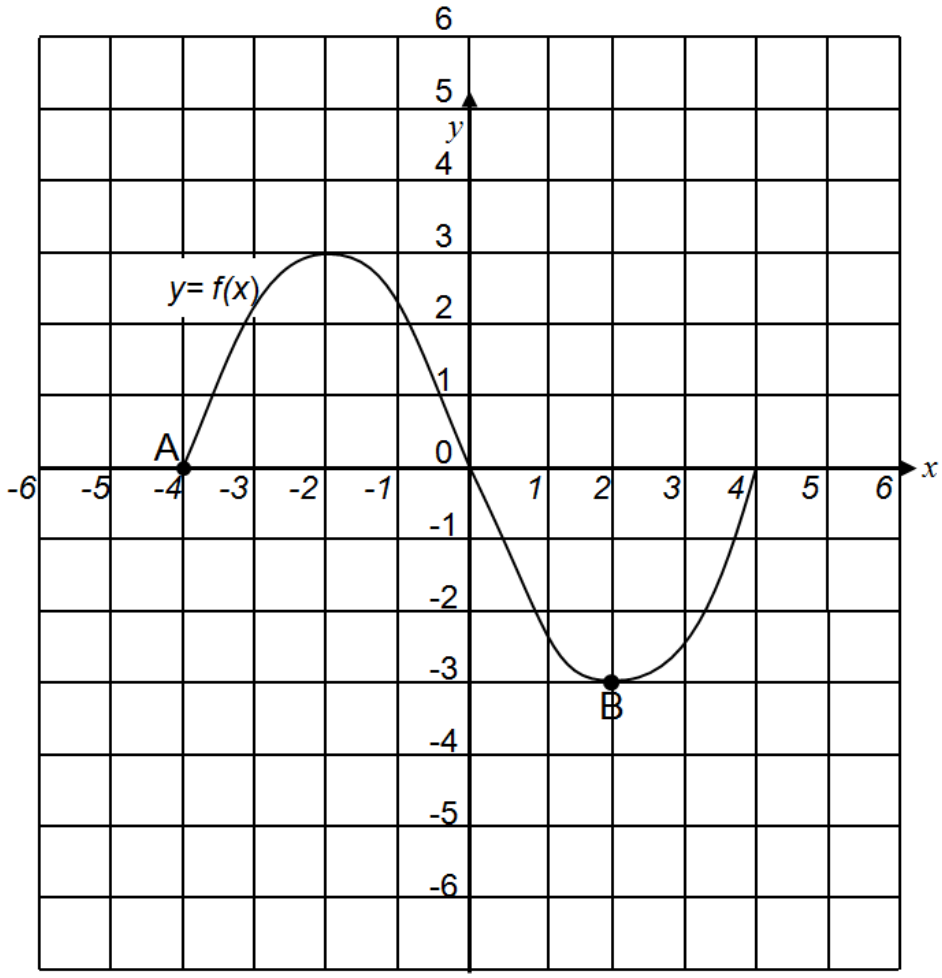
……..….. **(1)**



20. Prove that the recurring decimal $4.2\dot{7} = \frac{77}{18}$

(3)

21. The diagram shows a sketch of y = f(x).



a) Sketch the graph of y = f(2x) on the grid showing the co-ordinates of points A and B.

A (..... , ...)

B (..... , ...)

(2)

b) Sketch the graph of y = – 2f(x) on the grid showing the co-ordinates of points A and B.

A (..... , ...)

B (..... , ...)

(2)