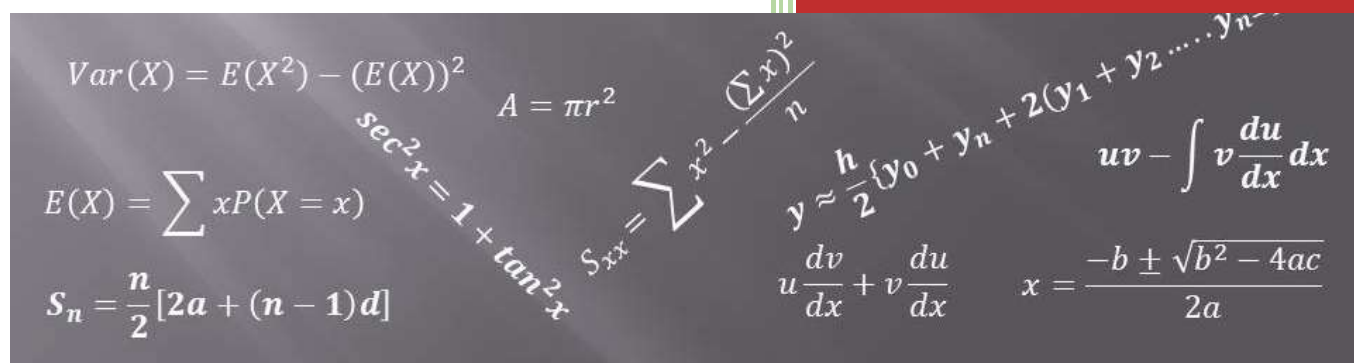


GCSE Higher Level Harder Questions Pack 2 - Questions



Question No.	Mark Scored	Mark
1		8
2		4
3		6
4		4
5		4
6		5
7		4
8		5
9		7
10		5
11		5
12		4
13		4
14		3
15		4
16		5
17		4
18		7
19		7
20		5
TOTAL		100



Calculators Allowed

Time Allowed: 2hrs

Give all answer to 3 significant figures unless otherwise stated

September 2013

MathsGeeks

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Question 1.

(a) Simplify

$$\frac{m^7 \times m^5}{m^2}$$

(2)

(b) Simplify

$$(2x)^3 \times (3x)^2$$

(2)

(c) Simplify

$$5a^2bc^3 \times 6ab^4c^2$$

(2)

(d) Factorise completely

$$6x^2y^2z^3 + 18x^3y^2z^2$$

(2)

Question 1: TOTAL: /8

Question 2.

Solve the equation

$$6x^2 + 9x - 13 = 0$$

Give each solution correct to 2 decimal places.

(4)

Question 2: TOTAL: /4

Question 3.

Julie invested £4500 for 3 years in a savings account.

She was paid 3% per annum compound interest.

a) How much did Julie have in his savings account after 3 years?

£ (3)

Julie also invested £3000 for n years in another savings account.

She was paid 8% per annum compound interest.

At the end of the n years she had ££4407.98 in the savings account.

(b) Work out the value of n .

(3)

Question 3: TOTAL: /6

.....

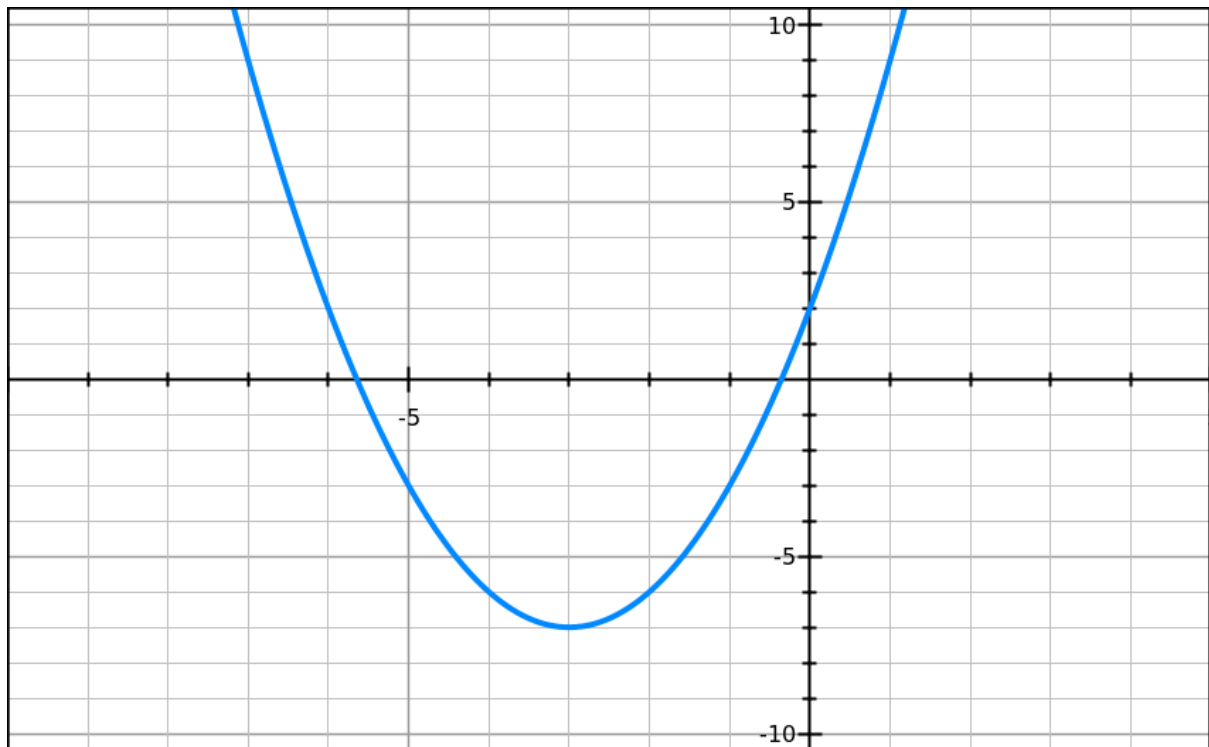
Question 4.

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This is a sketch of the curve with the equation $y = f(x)$.



The only minimum point of the curve is at $P(-3, -7)$.

(a) Write down the coordinates of the minimum point of the curve with the equation

$$y = f(x + 2)$$

(.....,) (2)

(b) Write down the coordinates of the minimum point of the curve with the equation

$$y = f(x + 2) + 5$$

(.....,) (2)

Question 4: TOTAL: /4

.....

Question 5.

Simplify fully

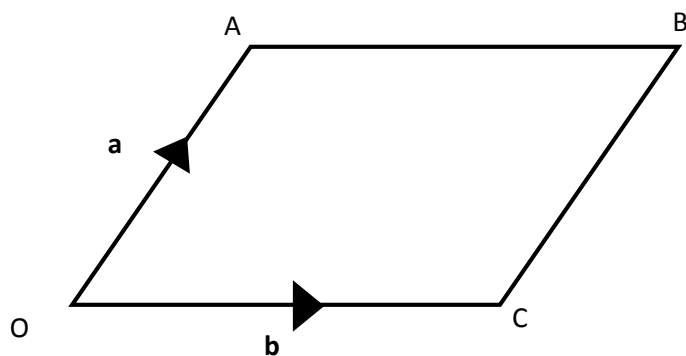
$$\frac{x^2 + 9x + 20}{x^2 - 16}$$

(4)

Question 5: TOTAL: /4

Question 6.

OABC is a parallelogram.



OA = a , OC = b

(a) Find the vector OB in terms of a and b .

$$\overrightarrow{AB} = \dots\dots\dots (2)$$

P is the point on \overrightarrow{OB} so that $\overrightarrow{OP} : \overrightarrow{PB} = 3 : 2$

(b) Find the vector \overrightarrow{AP} in terms of \mathbf{a} and \mathbf{b} .

Give your answer in its simplest form.

$$\overrightarrow{AP} = \dots\dots\dots (3)$$

Question 6: TOTAL: /5

Question 7.

Work out

$$(\sqrt{5} + 3)(\sqrt{5} - 3)$$

Give your answer in the simplest form.

$$\dots\dots\dots (4)$$

Question 7: TOTAL: /4

Question 8.

Solve the simultaneous equations

$$x - 3y = 10$$

$$3y + 2x = 8$$

$x = \dots\dots\dots, y = \dots\dots\dots$ (5)

Question 8: TOTAL: /5

Question 9.

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Elwin has 12 pens in a box.

5 of the pens are blue.

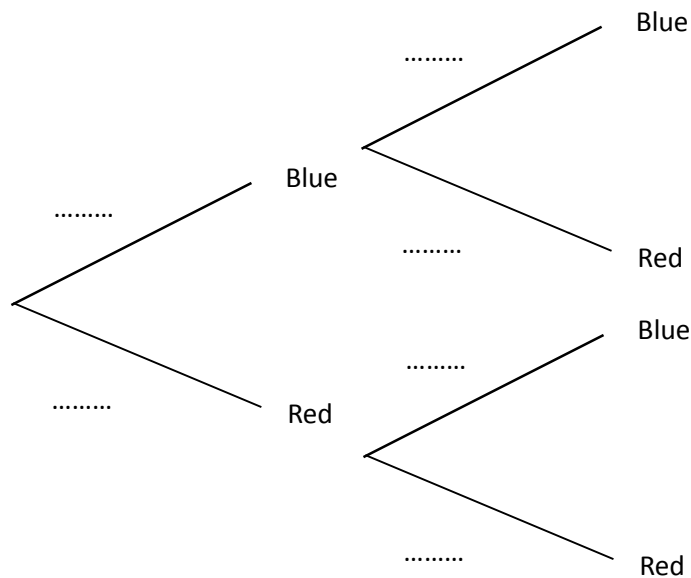
7 of the pens are red.

Elwin takes at random a pen from the box and writes down its colour.

Elwin DOES NOT put the pen back in the box.

Then Elwin takes at random a second pen from the box, and writes down its colour.

a) Complete the probability tree diagram.



(4)

b) Work out the probability that Elwin takes exactly one pen of each colour from the box.

..... (3)

Question 9: TOTAL: /7

Question 10.

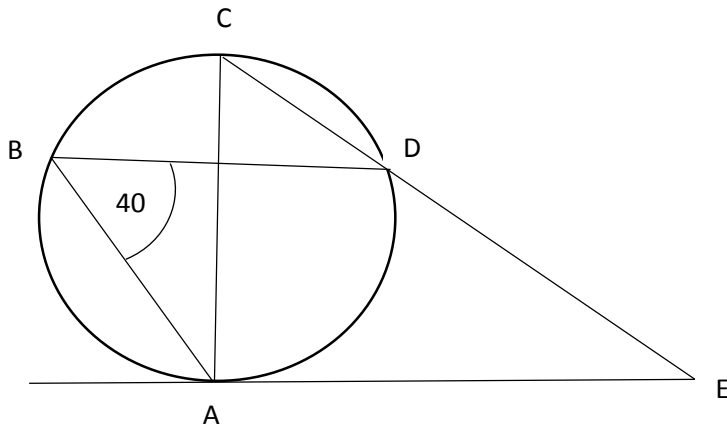


Diagram **NOT**
accurately drawn

A, B, C, and D lie on a circle.

AE is a tangent to the circle.

AC is the diameter of the circle.

Angle ABD = 40° .

(a) Find the size of angle ACE.

Give a reason for your answer.

..... $^\circ$ (2)

(b) Find the size of angle CEA.

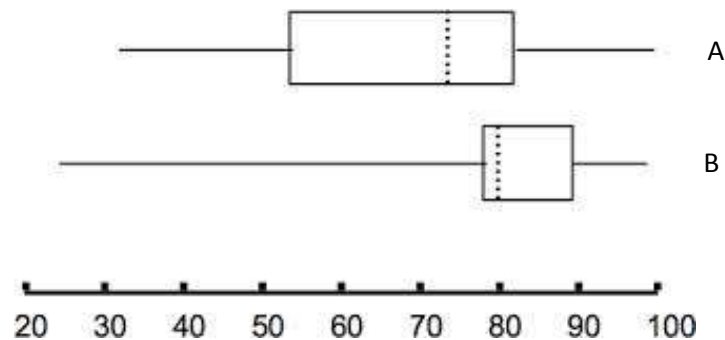
Give a reason for your answer.

..... $^\circ$ (3)

Question 10: TOTAL: /5

Question 11.

The box plots show the distribution of weights (kg) of two different groups (A and B) of athletes.



a) What is the largest weight of an athlete in group A

.....kg (1)

b) What is the interquartile range of the data for group B.

.....kg (2)

c) Compare the distributions of the weight of the two groups of athletes A and B.

1

.....

.....

2

.....

.....

(5)

Question 11: TOTAL: /5

.....

Question 12.

Make x the subject of the formula

$$6(x + y) = 3 - 8x$$

Give your answer in its simplest form.

$$x = \dots\dots\dots (4)$$

Question 12: TOTAL: /4

.....

Question 13.

a) Write in standard index form 5, 670, 000

..... (1)

b) Write in standard index form 0.000167

..... (1)

c) Work out $\frac{3.12 \times 10^2 + 5.6 \times 10^3}{1.34 \times 10^4}$ writing your answer in standard form

..... (2)

Question 13: TOTAL: /4

.....

Question 14.

(a) Write down the value of 6^0 .

..... (1)

(b) Write down the value of

$$\left(\frac{4}{3}\right)^{-1}$$

..... (2)

Question 14: TOTAL: /3

.....

Question 15.

k is an integer such that $-2 \leq k < 2$

(a) List all the possible values of k .

..... (2)

(b) Solve the inequality

$$7y \geq -y + 16$$

..... (2)

Question 15: TOTAL: /4

.....

Question 16.

$$y = \frac{a^2}{b}$$

a = 7.35 correct to 2 decimal places.

b = 6.789 correct to 3 decimal places.

By considering bounds, work out the maximum possible value of y to 3 decimal places.

You must show all your working and give a reason for your final answer.

y = (5)

Question 16: TOTAL: /5

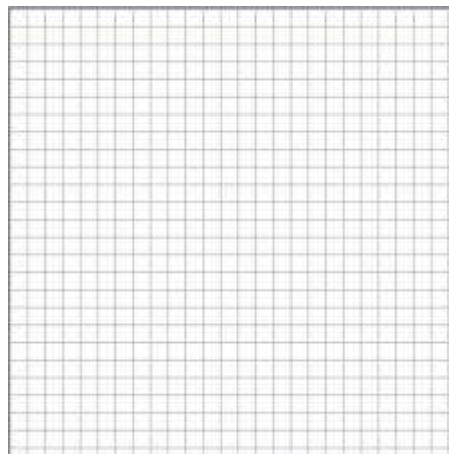
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Question 17.

The table gives some information about the time, in minutes, it takes 100 year 11 students to walk to school.

Time (t) minutes	Frequency
$0 < t \leq 5$	5
$5 < t \leq 10$	10
$10 < t \leq 20$	25
$20 < t \leq 30$	45
$30 < t \leq 45$	9
$45 < t \leq 60$	6

Use the information to construct a frequency density histogram.



(4)

Question 17: TOTAL: /4

Question 18.

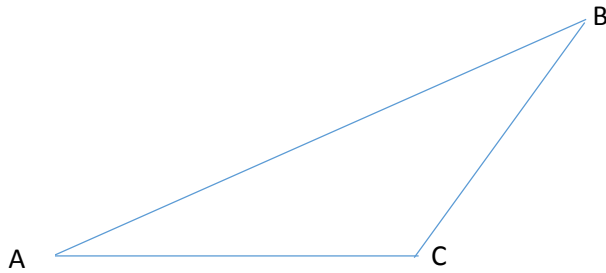


Diagram **NOT**
accurately drawn

In triangle ABC,

$AC = 5.5 \text{ cm}$.

$BC = 4.4 \text{ cm}$.

Angle $ACB = 109^\circ$.

a) Calculate the area of triangle ABC.

Give your answer correct to 3 significant figures.

..... cm^2 (3)

b) Calculate the length of AB.

Give your answer correct to 3 significant figures.

..... cm (3)

c) Calculate the perimeter of triangle ABC

Give your answer correct to 3 significant figures.

..... cm (1)

Question 18: TOTAL: /7

.....

Question 19.

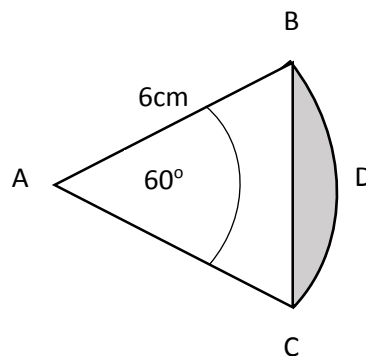


Diagram **NOT**
accurately drawn

BAC is a sector of a circle, radius 6 cm.

The angle BAC is 60° .

a) Find the length of BC.

..... cm (3)

b) Work out the area of the shaded region BDC.

Area = cm^2 (4)

Question 19: TOTAL: /7

.....

Question 20.

a is directly proportional to b .

When $a = 1000$, $b = 25$

(a) Find a formula for a in terms of b .

$a =$ (3)

(b) Calculate the value of a when $b = 350$

$y =$ (2)

Question 20: TOTAL: /5