Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						1	3	8	0	/	4	H	Signature	

Paper Reference(s)

1380/4H

Examiner's use only

Team Leader's use only

Edexcel GCSE

Mathematics (Linear) – 1380

Paper 4 (Calculator)

Higher Tier

Friday 10 June 2011 – Morning

Time: 1 hour 45 minutes

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page.
Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 26 questions in this question paper. The total mark for this paper is 100.
There are 24 pages in this question paper. Any blank pages are indicated.
Calculators may be used.
If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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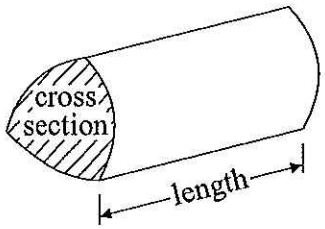
GCSE Mathematics (Linear) 1380

Formulae: Higher Tier

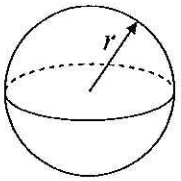
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



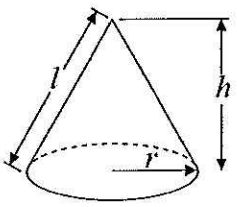
Volume of sphere $= \frac{4}{3}\pi r^3$

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

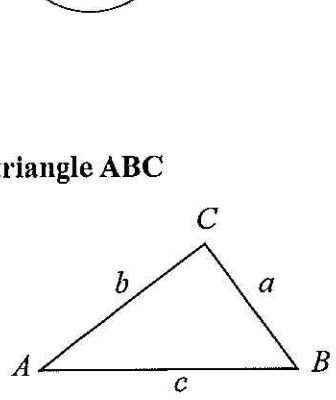


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$



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 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

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

Leave blank

Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Each student at a college studies one of four languages.

The table shows the probability a student chosen at random studies German or Russian or French.

Language	German	Spanish	Russian	French
Probability	0.2		0.1	0.5

A student is chosen at random.

(a) Work out the probability that the student studies Spanish.

$1 - 0.2 - 0.1 - 0.5 = 0.2$

0.2

(2)

There are 800 students at the college.

(b) Work out the number of students who study German.

$0.2 \times 800 = 160$.

160.

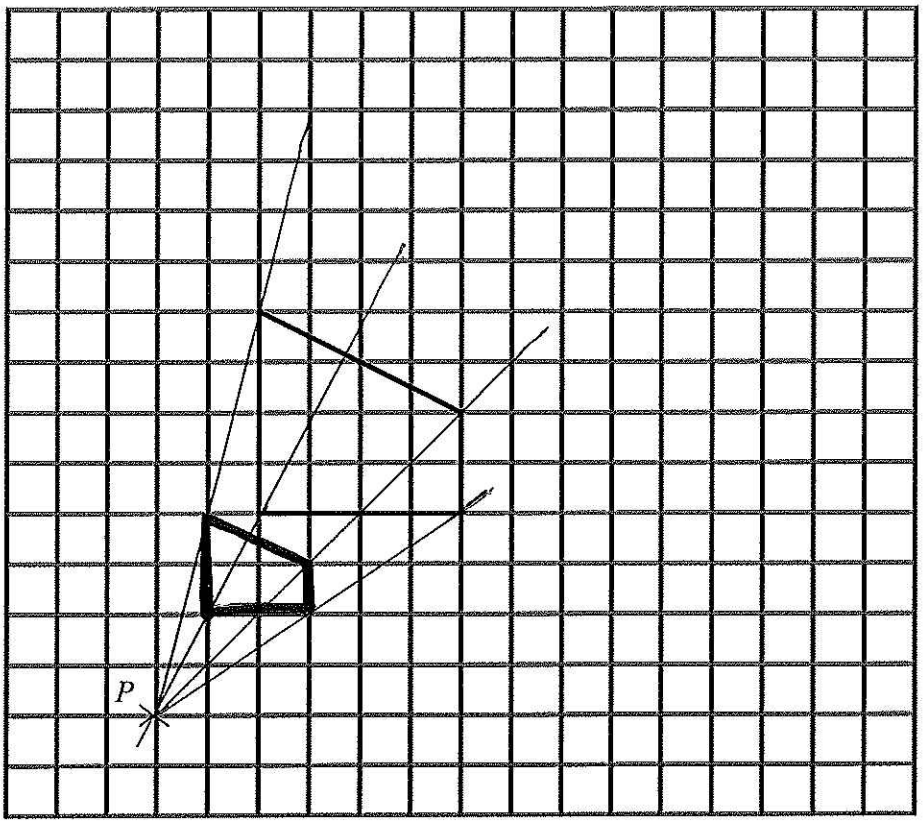
(2)

Q1

(Total 4 marks)

Leave blank

2.

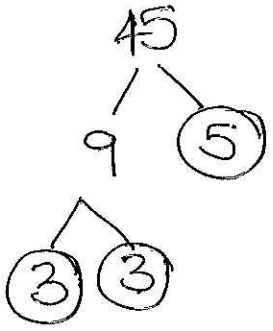


On the grid, enlarge the shape with a scale factor of $\frac{1}{2}$, centre P.

(Total 3 marks)

Q2

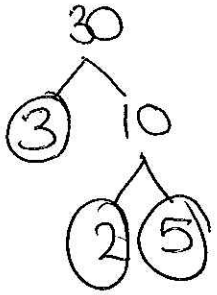
3. (a) Express 45 as a product of its prime factors.



$3 \times 3 \times 5 = 3^2 \times 5$

(2)

(b) Find the Highest Common Factor (HCF) of 45 and 30



$3 \times (3 \times 5) = 45$

$2 \times (3 \times 5) = 30$

$3 \times 5 = 15$

HCF = 15

(2)

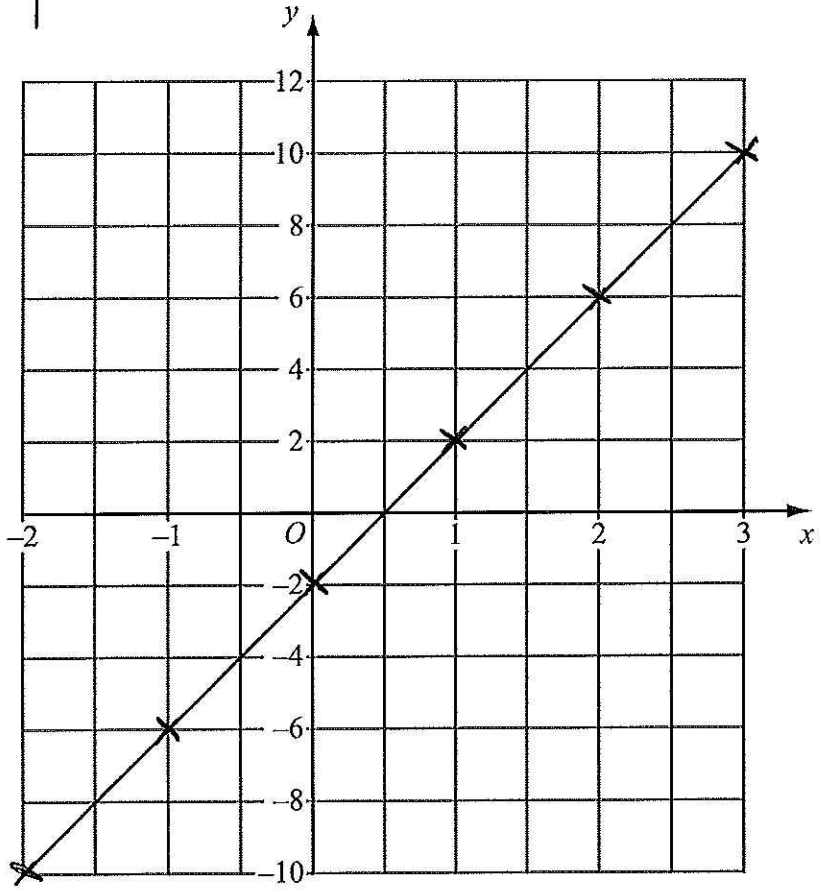
(Total 4 marks)

Q3

Leave blank

4. On the grid, draw the graph of $y = 4x - 2$

x	-2	-1	0	1	2	3
y	-10	-6	-2	2	6	10



Q4

(Total 3 marks)

Leave blank

5. The diagram shows a circular pond with a path around it.

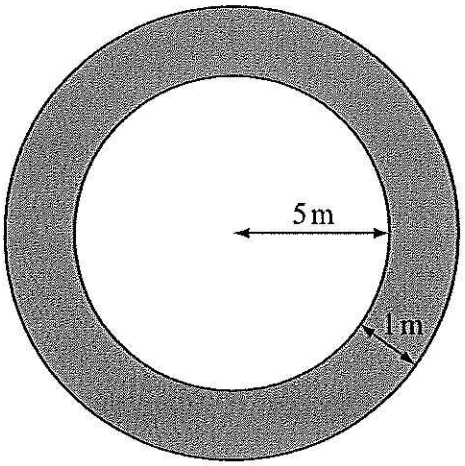


Diagram **NOT** accurately drawn

The pond has a radius of 5 m.
The path has a width of 1 m.

Work out the area of the path.
Give your answer correct to 3 significant figures.

Area of Pond $\rightarrow \pi \times 5^2 = 78.5398$

Area of Pond and Path $\rightarrow \pi \times 6^2 = 113.0973$.

Area of Path $\rightarrow 113.0973 - 78.5398$

$= 34.5575 \text{ cm}^2$

$= 34.6 \text{ cm}^2$ (3 sf).

..... m^2

(Total 3 marks)

Q5

Leave blank

6. Here are the ages, in years, of 16 people.

36 18 18 25 36 28 45 30

38 27 41 16 36 48 28 21

(a) Draw an ordered stem and leaf diagram to show this information.
You must include a key.

1	6 8
2	1 5 7 8 8
3	0 6 6 6 8
4	1 5 8 8

Key: 1|6 = 16

(3)

(b) Find the median age.

$$\frac{36+30}{2} = 33$$

33 years

(2)

Q6

(Total 5 marks)

Leave blank

7. Bob has 120 beads.
The beads are either red or green.

Bob gives $\frac{3}{4}$ of the beads to his friend.

$\frac{2}{3}$ of the beads Bob now has are red.

Work out how many green beads Bob now has.

120

30 90

30

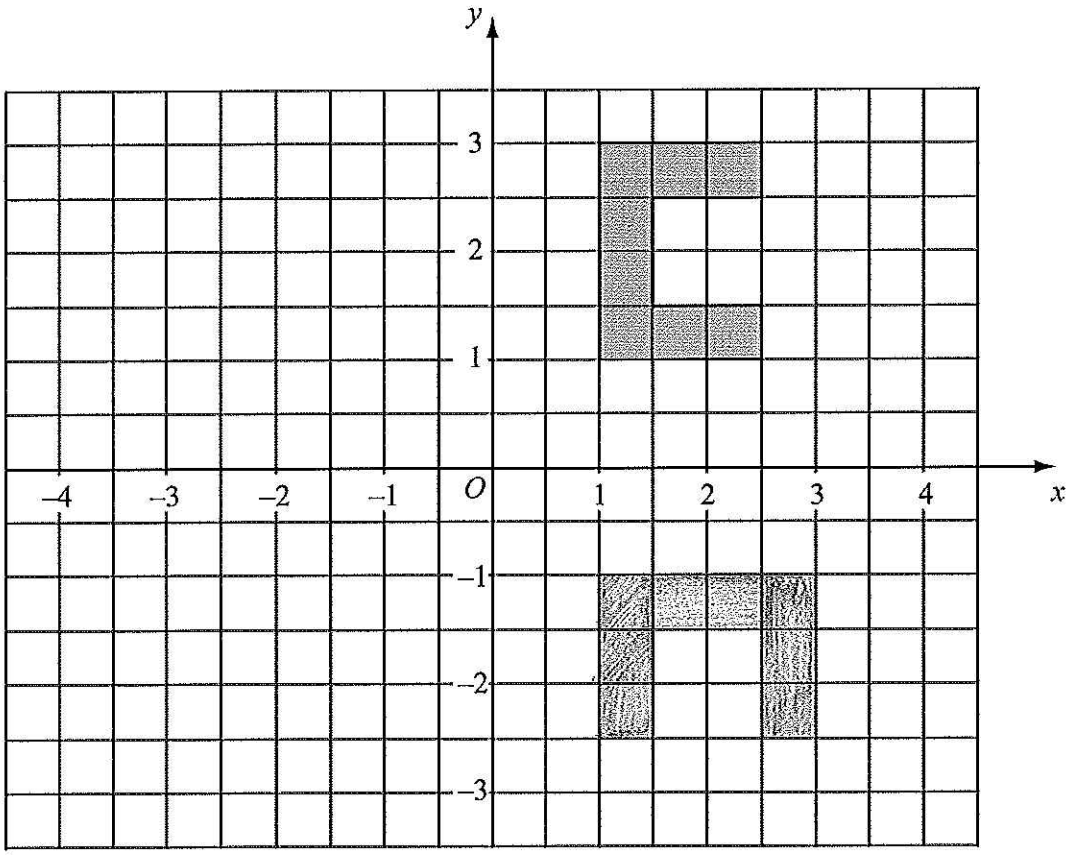
10 20

10 green beads

Q7

(Total 3 marks)

8.



Rotate the shape 90° clockwise, centre *O*.

Q8

(Total 2 marks)

Leave blank

9.

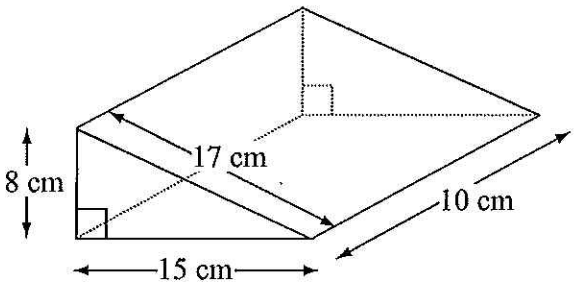


Diagram **NOT** accurately drawn

Work out the **total** surface area of the triangular prism.

Area of front & back triangular faces → $\frac{15 \times 8}{2} \times 2 \rightarrow 120$

Area of base → $15 \times 10 \rightarrow 150$

Area of slanted face → $17 \times 10 \rightarrow 170$

Area of back → $8 \times 10 \rightarrow 80$.

520cm^2.

Q9

(Total 4 marks)

Leave blank

10. (a) Simplify $6e + 5f + e - 3f$

$7e + 2f$

(2)

(b) Solve $4(2x - 1) = 3x - 19$

$8x - 4 = 3x - 19$

$5x - 4 = -19$

$5x = -15$

$x = \frac{-15}{5} = -3.$

$x = -3$

(3)

(c) Solve $\frac{y+4}{5} = 30$

$y + 4 = 30 \times 5$

$y + 4 = 150$

$y = 150 - 4$

$= 146$

$y = 146$

(2)

Q10

(Total 7 marks)

Leave blank

11. Bianca asked 32 women about the number of children they each had.

The table shows information about her results.

Number of children	Frequency	x X f
0	9	0
1	6	6
2	7	14
3	8	24
4	2	8
more than 4	0	0
	32	52.

(a) Find the mode.

↑ most common.

0

(1)

(b) Calculate the mean.

$$\frac{\sum xf}{\sum f} = \frac{52}{32} = 1.625$$

1.625.

(3)

(Total 4 marks)

Q11

Leave blank

12. The equation

$$x^3 + 5x = 67$$

has a solution between 3 and 4

Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show **ALL** your working.

x	$x^3+5x=67$	
3	$3^3+5(3)=42$	Too small
4	$4^3+5(4)=84$	Too big
3.5	$3.5^3+5(3.5)=60.375$	Too small.
3.7	$3.7^3+5(3.7)=69.153$	Too big
3.6	$3.6^3+5(3.6)=64.656$	Too small
3.65	$3.65^3+5(3.65)=66.87$	Too small

↑ Remember to do the check as a mark is awarded for this.

$x =$ 3.7 **Q12**

(Total 4 marks)

13. Use your calculator to work out

$$\sqrt{\frac{920-170\tan 65°}{0.012+0.034}}$$

(a) Write down all the figures on your calculator display.
You must write your answer as a decimal.

$\sqrt{12074.64834} =$

109.88847047

(2)

(b) Give your answer to part (a) correct to 3 significant figures.

110.

(1) **Q13**

(Total 3 marks)

Leave blank

14. The table shows six expressions.
n is a positive integer.

$2n - 3$	$3n - 2$	$3(n + 4)$	$4n + 1$	$4(3n + 1)$	$2n + 1$

(a) From the table, write the expression whose value is

(i) always even

$4(3n+1)$

(ii) always a multiple of 3

$3(n+4)$

(2)

(b) From the table, write the expression which is a factor of $4n^2 - 1$

$2n+1$

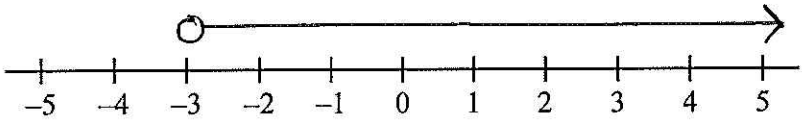
(1)

(Total 3 marks)

Q14

15. (a) $x > -3$

Show this inequality on the number line.



(2)

(b) Solve the inequality $7y + 36 \leqslant 8$

$7y \leq 8-36$

$7y \leq -28$

$y \leq \frac{-28}{7}$

$y \leq -4$

$y \leq -4$

(2)

(Total 4 marks)

Q15

Leave blank

16. In a sale the normal price of a book is reduced by 10%.
The sale price of the book is £4.86

Calculate the normal price of the book.

100% − 10% = 90%

90% = £4·86 ÷90

÷90 → 1% = £0·054

×100 → 100% = £5·40 ×100

£ 5·40 .....

(Total 3 marks)

Q16

Leave blank

17. The diagram shows two similar triangles.

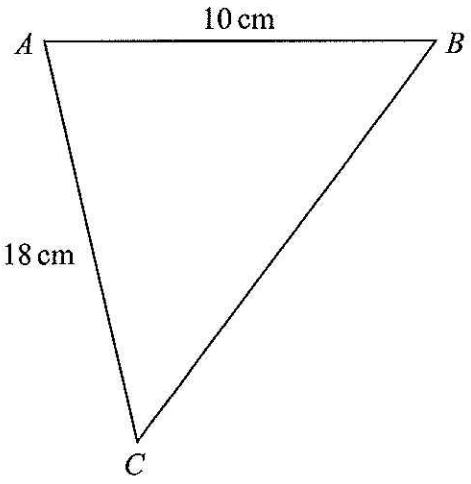
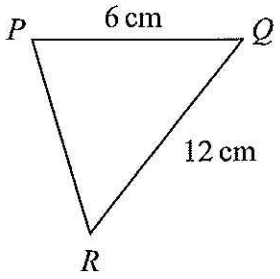


Diagram **NOT** accurately drawn



In triangle ABC, $AB = 10$ cm and $AC = 18$ cm.
In triangle PQR, $PQ = 6$ cm and $QR = 12$ cm.

Angle ABC = angle PQR.
Angle CAB = angle RPQ.

(a) Calculate the length of BC.

$12 \times \left(\frac{10}{6}\right) = 20$

20 . cm
(2)

(b) Calculate the length of PR.

$18 \div \left(\frac{10}{6}\right) = 10.8$

10.8 . cm
(2)

Q17

(Total 4 marks)

Leave blank

18. (a) Simplify $(c^2 k^5)^4$

$c^8 k^{20}$

(1)

(b) Expand and simplify $(3x + 5)(4x - 1)$

	$4x$	-1
$3x$	$12x^2$	$-3x$
$+5$	$+20x$	-5

$12x^2 + 17x - 5$

(2)

(c) Solve $x^2 - 3x - 10 = 0$

$(x-5)(x+2) = 0$

$x-5=0 \quad x+2=0$

$x = 5$ or $x = -2$

$x = 5$ or -2

(3)

Q18

(Total 6 marks)

19. The surface area of Earth is 510 072 000 km^2.
The surface area of Jupiter is 6.21795×10^{10} km^2.

The surface area of Jupiter is greater than the surface area of Earth.
How many times greater?
Give your answer in standard form.

$$\frac{6.21795 \times 10^{10}}{5.10072 \times 10^{8}} = 1.21904 \times 10^{2}$$

Q19

(Total 3 marks)

Leave blank

20. The table shows some expressions.
a, b, c and d represent lengths.
π and 2 are numbers that have no dimensions.

$c^2(b+d)$	πa^2c^2	$\frac{a^3b}{c^3}$	$\pi a^2 b$	$\frac{2a^3d}{c}$	d^2	$2a+b^2$
✓			✓	✓		

Tick (✓) the boxes underneath the **three** expressions which could represent volumes.

Q20

(Total 3 marks)

21.

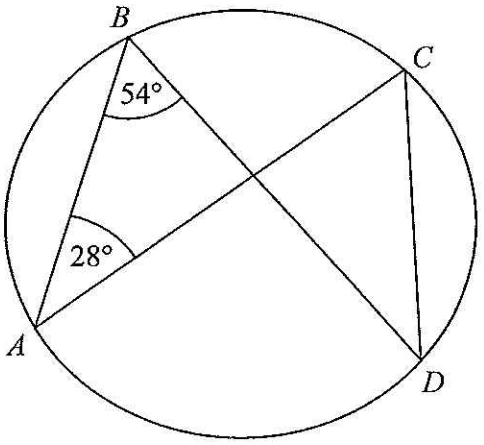


Diagram **NOT** accurately drawn

A, B, C and D are points on the circumference of a circle.
Angle $ABD = 54°$.
Angle $BAC = 28°$.

(i) Find the size of angle ACD.

54 °

(ii) Give a reason for your answer.

Angles in the same segment are equal.

Q21

(Total 2 marks)

Leave blank

22. There are three secondary schools in Banley.
The table shows the number of students in each of these schools.

Adis College	Greslow High	Fripp School
750	700	900

Germaine takes a sample of 50 students stratified by school.

Work out the number of students from Greslow High in the sample.

$\frac{700}{2350} \times 50 = 14.8936 \therefore 15.$

15.

Q22

(Total 2 marks)

Leave blank

23. The diagram below shows a large rectangle of length $(2x + 6)$ cm and width x cm.

A smaller rectangle of length x cm and width 3 cm is cut out and removed.

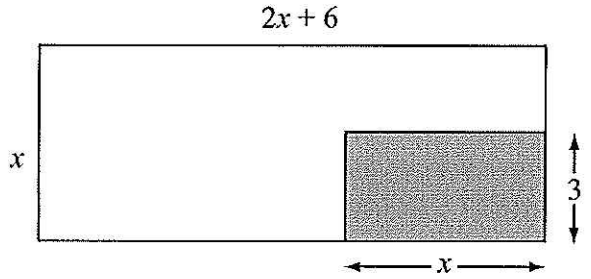


Diagram **NOT** accurately drawn

The area of the shape that is left is 100 cm^2.

(a) Show that $2x^2 + 3x - 100 = 0$

$x(2x+6) - 3x = 100$

$2x^2 + 6x - 3x = 100$

$2x^2 + 3x = 100$

$2x^2 + 3x - 100 = 0$

(3)

(b) Calculate the length of the smaller rectangle.
Give your answer correct to 3 significant figures.

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $\quad a = 2, b = 3, c = -100$

$x = \dfrac{-3 \pm \sqrt{3^2 - 4(2)(-100)}}{2(2)}$

$= \dfrac{-3 \pm \sqrt{809}}{4}$

$x = 6.36073$ or $x = -7.86073$

cannot have a negative length ∴ this value can be discarded

$x = 6.36$ ..... cm

(4)

Q23

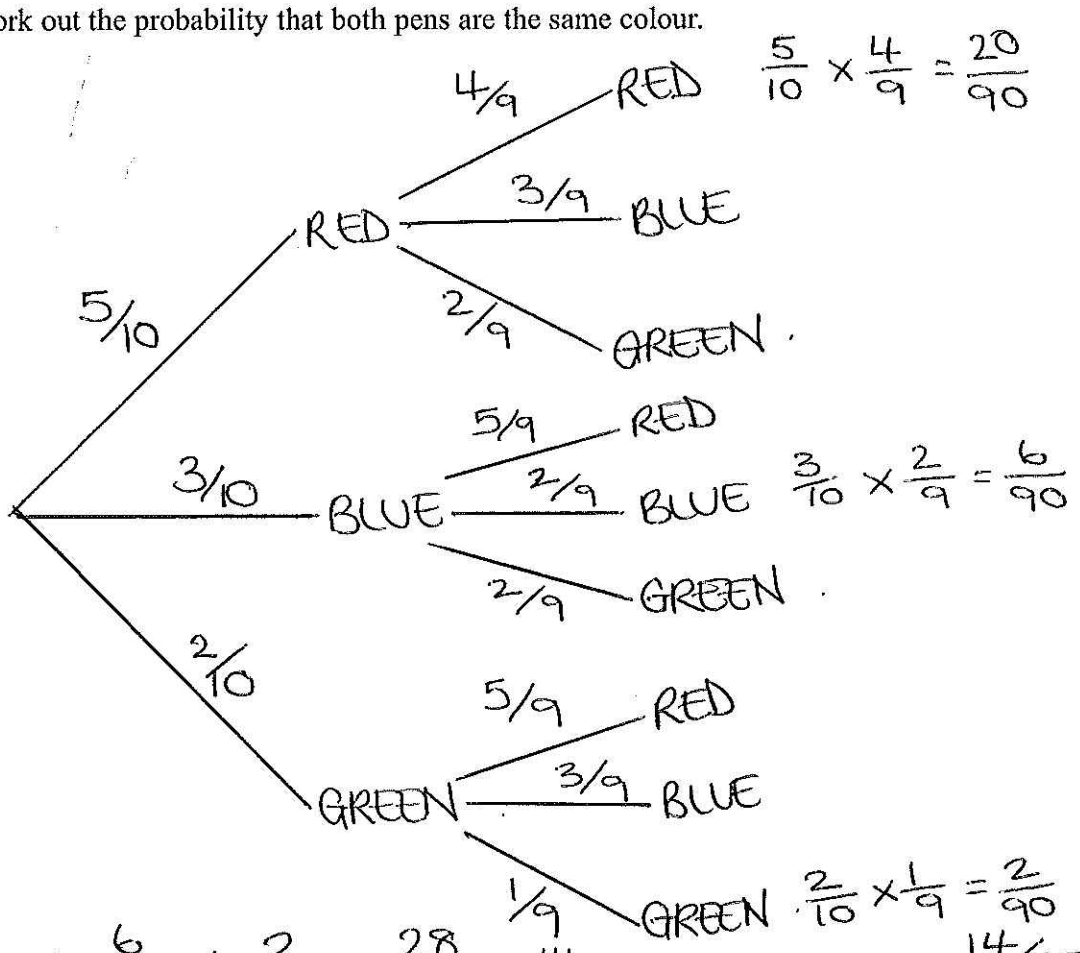
(Total 7 marks)

Leave blank

24. There are 5 red pens, 3 blue pens and 2 green pens in a box.

Gary takes at random a pen from the box and gives the pen to his friend.
Gary then takes at random another pen from the box.

Work out the probability that both pens are the same colour.



$\frac{5}{10} \times \frac{4}{9} = \frac{20}{90}$

$\frac{3}{10} \times \frac{2}{9} = \frac{6}{90}$

$\frac{2}{10} \times \frac{1}{9} = \frac{2}{90}$

$\frac{20}{90} + \frac{6}{90} + \frac{2}{90} = \frac{28}{90} = \frac{14}{45}$

14/45 Q24

(Total 4 marks)

Leave blank

25.

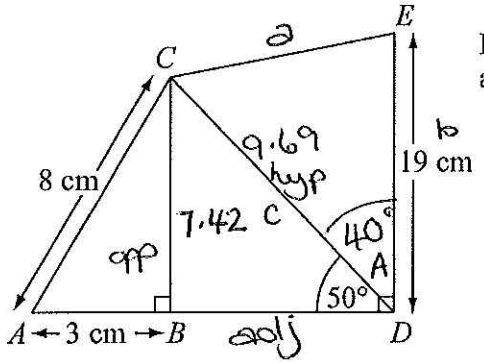


Diagram **NOT** accurately drawn

$AC = 8$ cm.
$AB = 3$ cm.
$DE = 19$ cm.
Angle ABC = angle CBD = angle $BDE = 90°$.
Angle $BDC = 50°$.

(a) Calculate the length of CD.
Give your answer correct to 3 significant figures.

Pythagoras
$BC^2 = 8^2 - 3^2$
$= 64 - 9$
$= 55$
$BC = \sqrt{55} = 7.42$cm.

Basic Trig
$\sin 50 = \frac{7.42}{CD}$.
$CD = \frac{7.42}{\sin 50}$
$= 9.686122087$ cm

9.69 cm

(4)

(b) Calculate the length of CE.
Give your answer correct to 3 significant figures.

cosine rule.
$a^2 = b^2 + c^2 - 2bc\cos A$.
$CE^2 = 19^2 + 9.69^2 - (2 \times 19 \times 9.69 \times \cos 40)$.
$CE^2 = 172.8232152$.
$CE = \sqrt{172.8232152}$
$= 13.14622437$cm

13.1 cm

(3)

Q25

(Total 7 marks)

Leave blank

26. The voltage V of an electronic circuit is given by the formula

$$V = IR$$

where I is the current in amps
and R is the resistance in ohms.

Given that $V = 218$ correct to 3 significant figures,
$R = 12.6$ correct to 3 significant figures,

calculate the lower bound of I.

$218 = I \times 12.6$

$217.5 = I \times 12.55$

$I = \frac{217.5}{12.55}$

17.33

Q26

(Total 3 marks)

TOTAL FOR PAPER: 100 MARKS

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