| 10-4-10 | **Year 11 mathematics: holiday revision**
Non-Calculator | **DAY 1** |

1. One night at a school concert the audience is made up as follows:

> $\frac{1}{4}$ are men, $\frac{3}{5}$ are women, and the rest are children.

(a) (i) What percentage of the audience are children?

....

....

(2)

(ii) What fraction of the audience are children?

....

....

....

(3)

(b) The next night the audience is made up in the following ratio:

> men : women : children = 2 : 4 : 3.

There are 270 people in the audience.
Calculate the number of men.

....

....

....

(2)

10-4-10	Year 11 mathematics: holiday revision Calculator	DAY 1

2. (a) Miss Evans earns £240 per week.
She is awarded a pay rise of 3.5%.

Mr Dale earns £220 per week.
He is awarded a pay rise of 4%.

Whose weekly pay increases by the greater amount of money?
You **must** show all your working.

....

....

....

....

....

....

Answer ....

(4)

(b) In 2003 the State Pension was increased by 2% to £78.03.
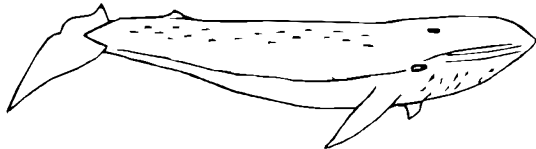What was the State Pension before this increase?

....

....

....

Answer £ ....

(3)

| 10-4-10 | Year 11 mathematics: holiday revision Non-Calculator | DAY 2 |

3. In the year 1900, estimates were made of the numbers of three types of whales.
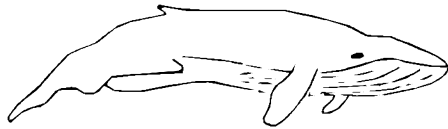
The estimates were made again in 1993.

The information for the Sei Whales is not shown on the diagram.

Blue Whale

| Year 1900 | 200 000 | Year 1993 | 400 |

Fin Whale

| Year 1900 | 500 000 | Year 1993 | 140 000 |

Sei Whale

| Year 1900 | | Year 1993 | |

(a) Find the following fraction, giving your answer in its simplest form.

$$\frac{\text{Number of Blue Whales in 1993}}{\text{Number of Blue Whales in 1900}}$$

....

(1)

(b) Calculate the percentage decrease in the number of Fin Whales between the years 1900 and 1993.

....

....

(3)

(c) The ratio of Sei Whales for 1900 to Sei Whales for 1993 is 5 : 1.
The combined total of these whales for the two years was 300 000.
How many Sei Whales were estimated in 1900?

....

(2)

10-4-10	Year 11 mathematics: holiday revision Calculator	DAY 2

4. James invests £700 for 2 years at 10% per year compound interest.
How much interest does he earn?

....

....

....

....

Answer £ ....

(2)

10-4-10	Year 11 mathematics: holiday revision Non-Calculator	DAY 3

5. Yogurt is sold in small pots and large pots.

    (a)   A small pot costs 20 pence.
                A large pot costs 150% **more.**
                How much does a large pot cost?

....

....

....

....

                Answer .... pence

(2)

    (b)   The ratio of the weight of a small pot to the weight of a large pot is 3 : 11.
                The weight of a small pot is 120 g.

                What is the weight of a large pot?

....

....

....

....

                Answer .... g

(3)

    (c)   The weight of a small pot is correct to the nearest gram.

                What is the minimum weight of a small pot?

                Answer .... g

(1)

| 10-4-10 | Year 11 mathematics: holiday revision
Calculator | DAY 3 |

6. Work out:

(a) i) $\dfrac{5}{8}$ of £9.60

....

....

ii) 24% of 35 metres.

....

....

(b) Change $\dfrac{3}{8}$ into
   i)   a decimal fraction,

....

....

   ii)   a percentage.

....

....

(4 marks)

10-4-10	Year 11 mathematics: holiday revision Non-Calculator	DAY 4

7.
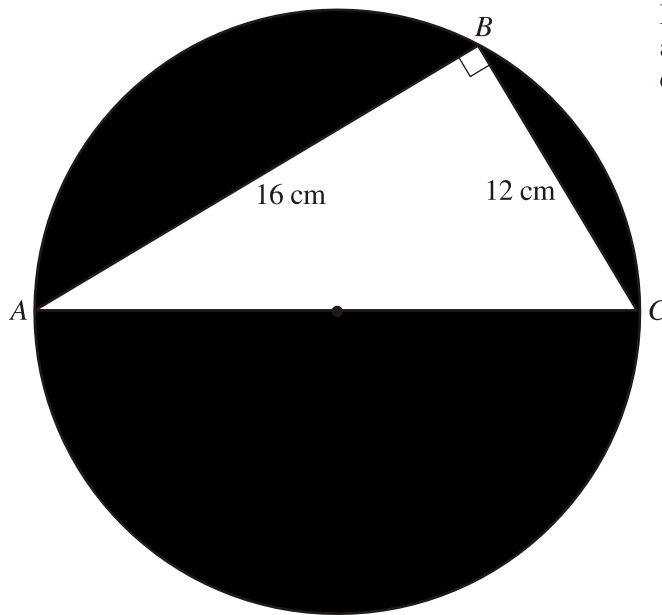
Diagram **NOT** accurately drawn

The diagram shows a right-angled triangle *ABC* and a circle.
A, *B* and *C* are points on the circumference of the circle.

AC is a diameter of the circle.
Using Pythagoras find the length of the diameter AC.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

Given π is approximately 3.14

Calculate the area of the shaded part of the circle.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

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(6 marks)

10-4-10	Year 11 mathematics: holiday revision Calculator	DAY 4

8. Sidney places the foot of his ladder on horizontal ground and the top against a vertical wall. The ladder is 16 feet long.
The foot of the ladder is 4 feet from the base of the wall.

16 Feet

4 Feet

(a) Work out how high up the wall the ladder reaches.
Give your answer to 3 significant figures.

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

(b) Work out the angle the base of the ladder makes with the ground.
Give your answer to 3 significant figures.

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……………………………………………………………………………………………
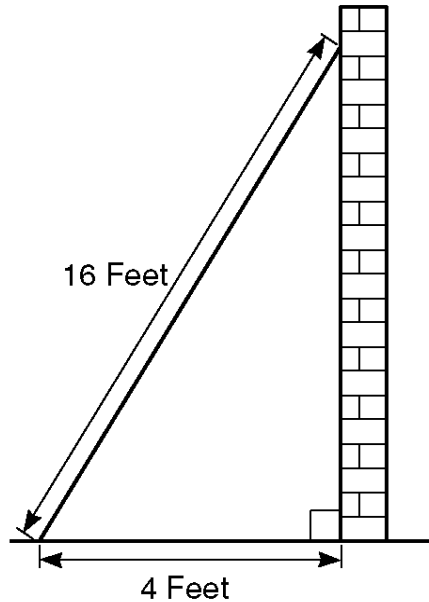
(6 marks)

10-4-10	**Year 11 mathematics: holiday revision** **Non-Calculator**	**DAY 5**

9. The diagram is a drawing of a triangular prism.
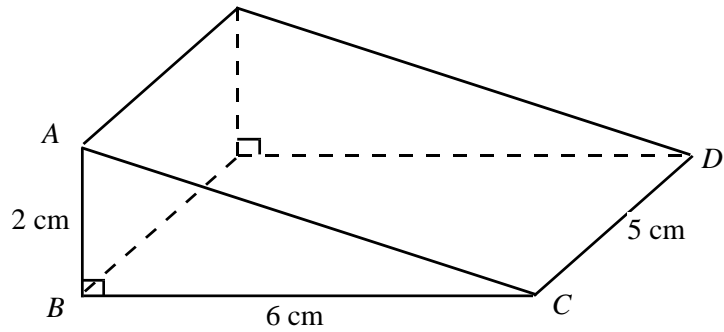
(a) Calculate the area of triangle *ABC*.

....

....

....

(2)

(b) Calculate the volume of the prism.

....

....

....

(2)

10-4-10	Year 11 mathematics: holiday revision Calculator	DAY 5

10.   The diagram shows a cylinder.
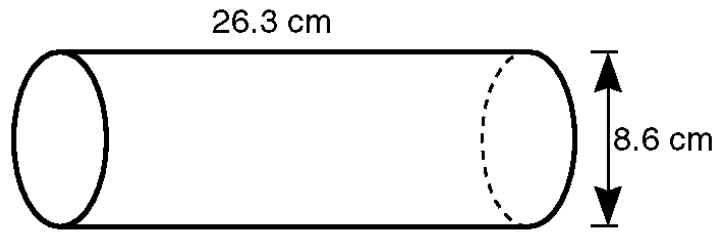
Diagram **NOT**
accurately drawn

26.3 cm

8.6 cm

The height of the cylinder is 26.3 cm.

The diameter of the base of the cylinder is 8.6 cm.

Calculate the volume of the cylinder.
Give your answer correct to 3 significant figures.

....

....

....

....

....

....

(4 marks)

10-4-10	**Year 11 mathematics: holiday revision** **Non-Calculator**	**DAY 6**

11. (a) The triangle has angles $x°$, $2x°$ and $84°$ as shown.
Find the value of x.
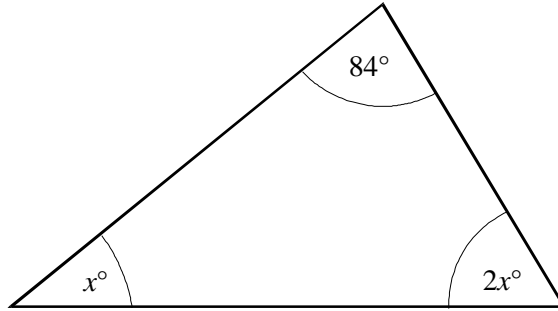
Not drawn
accurately

....

....

Answer .... degrees

(3)

(b) $5(2x - 1) = 35$,

....

....

(2)

(c) $4x + 3 = 18 - 2x$.

....

....

(2)

10-4-10	Year 11 mathematics: holiday revision Calculator	DAY 6

12. The angles of a quadrilateral are 73°, $2x°$, $3x°$ and 102°.

73°

102°

Not drawn accurately

$3x°$

$2x°$
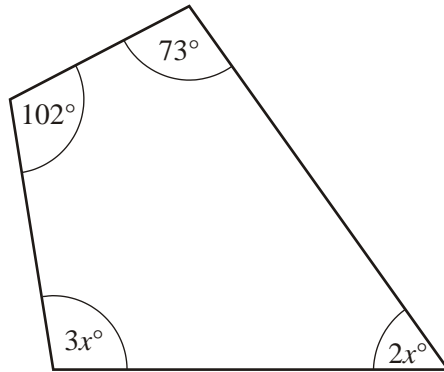
(a) Write down an equation in x.

....

....

(2)

(b) Use your equation to find the largest angle in the quadrilateral.

....

....

Answer .... degrees

(3)

(c) Solve

$$\frac{q}{3} = -7.4$$

....

....

Answer $q =$
....

(2)

10-4-10	Year 11 mathematics: holiday revision Non-Calculator	DAY 7

13. (a) Simplify

$$10d + 3e - 2d - 7e$$

....

....

Answer ....

(2)

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

....

....

Answer ....

(3)

(ii) Multiply out and simplify $(n + 3)^2$

....

.

....

Answer ....

(3)

(c) Simplify

(i) $y^4 \times y^{-3}$

....

Answer ....

(1)

(ii) $y^4 \div y^5$

....

Answer ....

(1)

10-4-10	Year 11 mathematics: holiday revision Calculator	DAY 7

14. (a) Expand and simplify

$$x(2x - 3) + 4(x^2 + 1)$$

....

................…………………………………………………………………………

....

....

Answer ....

(3)

(b) Factorise $4c + 64$

................…………………………………………………………………………

Answer ....

(1)

(c) Factorise $x^2 + 5x$

................…………………………………………………………………………

................…………………………………………………………………………

Answer ....

(2)

(d) Factorise $8x^3y^2 - 4xy^3$

................…………………………………………………………………………

................…………………………………………………………………………

Answer ....

(2)

| 10-4-10 | **Year 11 mathematics: holiday revision**
Non-Calculator | **DAY 8** |

15. James plants some sunflower seeds.
He plants two seeds in each pot.

The probability that a seed grows is $\dfrac{4}{5}$

The probability tree diagram shows the outcomes for the two seeds in a pot.

(a)   Complete the probability tree diagram.

First seed   **Second seed**

(2)
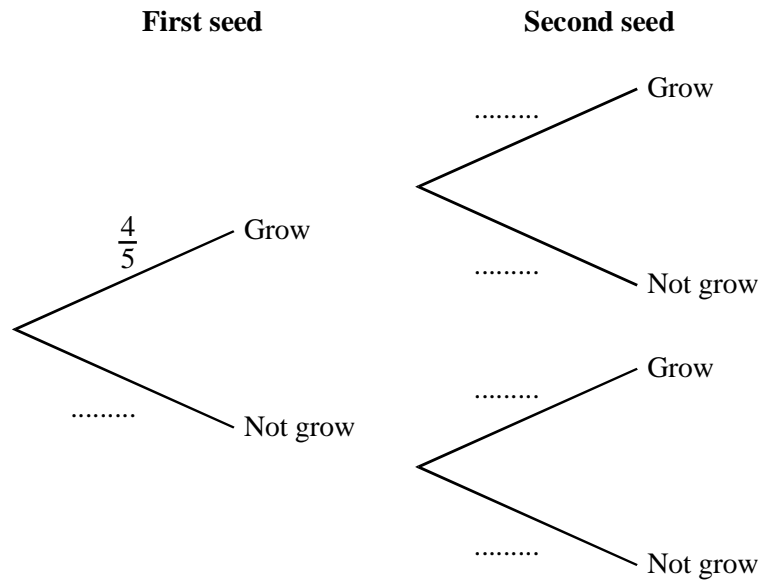
(b)   (i)   What is the probability that both seeds grow?

....

....

(2)

(ii)   What is the probability that at least one seed grows?

....

....

....

(2)

10-4-10	**Year 11 mathematics: holiday revision** **Calculator**	**DAY 8**

16(i). Ruth made a spinner with three colours, green, blue and red.
She tested it by spinning it 500 times.

Her results were

227 landed on green
176 landed on blue
97 landed on red.
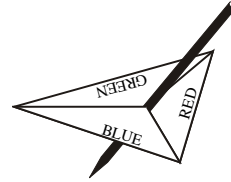
(a) Estimate the probability of the spinner landing on blue.

....

(2)

(b) In a game, the spinner is used 100 times.
How many times would you expect the spinner to land on blue?

....

(2)

16(ii). (a) Three cards are numbered 1, 3 and 4. Three discs are numbered 2, 4 and 5.

| 1 | 3 | 4 | (2) | (4) | (5) |

A game consists of picking one card at random and one disc at random.
The numbers on the card and disc are added together.

Complete the table to show all the possible totals.

Disc

Card		2	4	5
	1	3		
	3			
	4			

(b) What is the probability of getting a total which is an even number?.

(4)

| 10-4-10 | Year 11 mathematics: holiday revision
Non-Calculator | DAY 9 |

17. Write down the *n*th term for each of the following sequences.

(a) 3, 6, 9, 12 ....

....

....

(1)

(b) 1, 4, 7, 10 ....

....

....

(1)

(c) 1, 4, 9, 16, ...

....

....

(1)

(d) 4, 16, 36, 64, ...

....

....

(2)

10-4-10	Year 11 mathematics: holiday revision Calculator	DAY 9

18. A sequence of numbers is shown below.

The first two terms are 3 and 4.

The remaining terms are found by adding together the two previous terms.

$$3, 4, 7, 11, 18, 29, . . .$$

(a) Write down the next two terms in the sequence.

....

(1)

(b) The numbers from the first sequence are used to find the terms of a second sequence as shown below.

The terms are given to 2 decimal places.

$$4 \div 3 = 1.33$$
$$7 \div 4 = 1.75$$
$$11 \div 7 = 1.57$$

(i) Calculate the next three terms of this second sequence.

....

.

....

....

(ii) Write down what you notice about the terms in the second sequence.

....

....

.

....

(3)

| 10-4-10 | Year 11 mathematics: holiday revision Non-Calculator | DAY 10 |

19. Ten pupils took two examination papers in Mathematics.

Their marks out of 50 were as follows.

Paper 1	44	24	40	48	30	25	10	37	38	34
Paper 2	43	28	38	42	32	30	25	35	40	37

(a)   On the grid below draw a scatter diagram of these marks.

(2)

(b)   Draw a line of best fit for the points you have plotted.

(1)
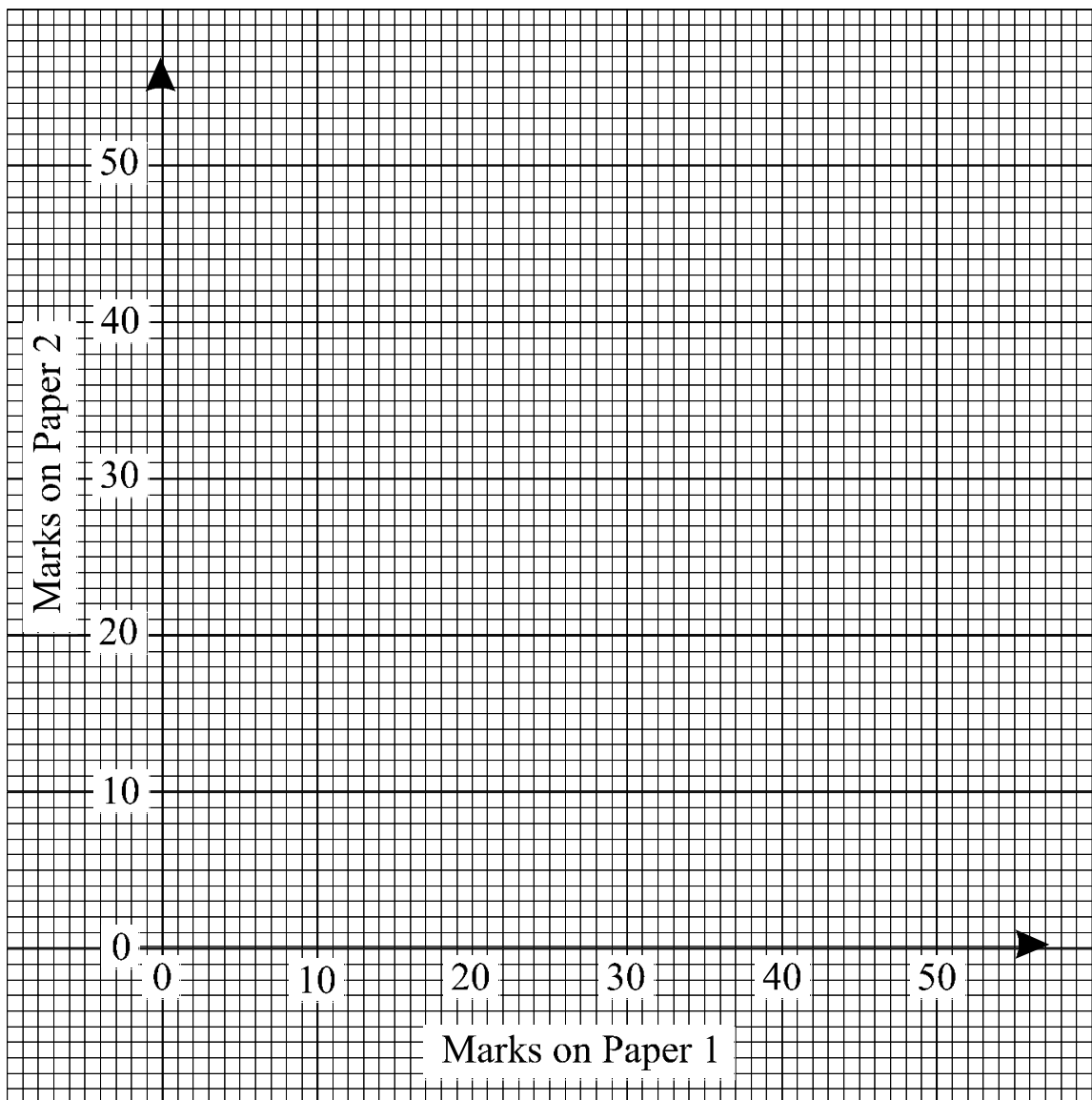
10-4-10	Year 11 mathematics: holiday revision Non-Calculator	DAY 10

(c) Omar was absent for Paper 2. He scored 32 marks on Paper 1.

  (i) What mark do you think it fair to give him for Paper 2?

  ....

  (ii) State how you got your answer.

  ....

  ....

  ....

  (2)

(d) These pupils also took an examination paper in Art and one in Chemistry.
A scatter diagram of these marks is drawn.
How might it be different from the one drawn for the two Mathematics
papers?
....

....

....

  (1)

| 10-4-10 | Year 11 mathematics: holiday revision Calculator | DAY 10 |

20. The countries of the world are divided into 'developed' and 'under-developed' countries.

The frequency table shows the distribution of ages for the population in the developed countries.

The figures are percentages and were estimated for the year 1985.

Age (y years)	Percentage of population	Cumulative Percentage
$0 < y \leq 15$	19	
$15 < y \leq 30$	22	
$30 < y \leq 45$	20	
$45 < y \leq 60$	17	
$60 < y \leq 75$	11	
$75 < y \leq 90$	9	
$90 < y \leq 105$	2	

(a)   Construct a cumulative frequency diagram to show this information.

Cumulative Percentage

(3)
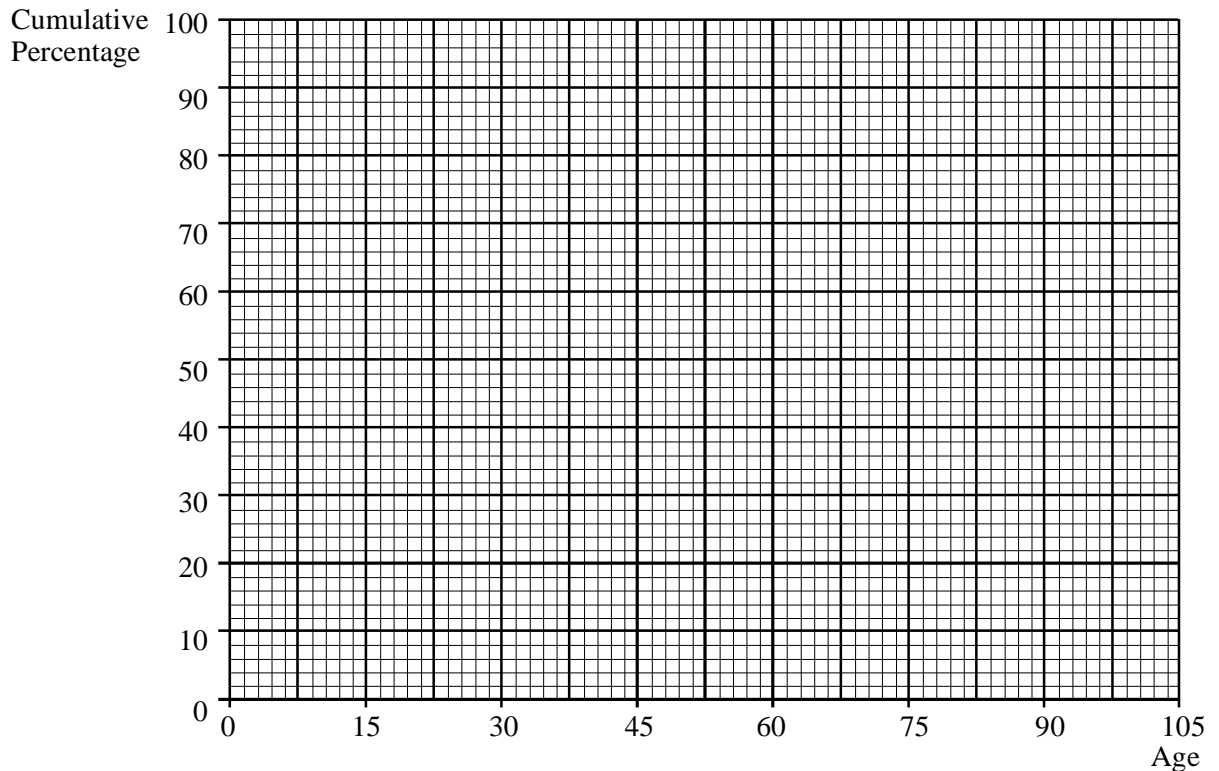
10-4-10	Year 11 mathematics: holiday revision Calculator	DAY 10

(b) (i)   What was the median age for the population in developed countries in 1985?

....

(1)

(ii)   The median age for the population in the under-developed countries in 1985 was 21.

What do the medians tell you about the difference between the population in the developed countries and the population in the underdeveloped countries?

....

....

....

....

(2)

ANSWERS….

| 10-4-10 | **Year 11 mathematics: holiday revision**
Non-Calculator Answers | **DAY 1** |

1.   One night at a school concert the audience is made up as follows:

> $\dfrac{1}{4}$ are men, $\dfrac{3}{5}$ are women, and the rest are children.

   (a)   (i)   What percentage of the audience are children?

   Remember percentage means 'out of 100'

   $\dfrac{1}{4} = \dfrac{25}{100} = 25\%$ *(This one you should know)*

   x 20

   $\dfrac{3}{5} = \dfrac{60}{100} = 60\%$

   x 20

   25% are men, 60 % are women so 100% - 25% - 60% = <u>15 %</u>

   So 15% are children.

   (2)

   (ii)   What fraction of the audience are children?

   $\div 5$

   15% is the same as $\dfrac{15}{100} = \dfrac{3}{20}$

   $\div 5$

   (3)

   (b)   The next night the audience is made up in the following ratio:

> men : women : children = 2 : 4 : 3.

   There are 270 people in the audience. Calculate the number of men.

   Total number of parts = 2 + 4 + 3 = 9 parts

   270 people shared between 9 parts

   $= \dfrac{270}{9} = 30$ *people per part, So 1 part represents 30 people*

   Men represent 2 parts

2 parts = 2 x 30 people = <mark>*60 people*</mark>   **(2)**

10-4-10	Year 11 mathematics: holiday revision Calculator answers	DAY 1

2.   (a)   Miss Evans earns £240 per week.
She is awarded a pay rise of 3.5%.

Mr Dale earns £220 per week.
He is awarded a pay rise of 4%.

Whose weekly pay increases by the greater amount of money?
You **must** show all your working.

Both pay increases are found by calculating a % of an amount

Remember percentage means 'out of 100'

3.5% means 3.5 out of 100 = $\dfrac{3.5}{100}$ *= 3.5 ÷ 100 = 0.035*

4% means 4 out of 100 = $\dfrac{4}{100}$ *= 4 ÷ 100 = 0.04*

So 3.5% of £240	*So 4% of £220*
= 0.035 x 240	*= 0.04 x 220*
= 8.4 = £8.40 (Not £8.04)	*= 8.8 = £8.80 (Not £8.08)*

<mark>Mr Dale gets a greater pay increase of £8.80</mark> compared to £8.40

                                                            (4)

(b)   In 2003 the State Pension was increased by 2% to £78.03.
What was the State Pension before this increase?

This is quite a difficult percentage question!

100% represents the total state pension before the increase.

We know that 100% + 2% increase = 102% = £78.03

<u>*Use the diagram to calculate 100%, by first finding 1%*</u>

102%
= £78.03   100% = <mark>*£76.50*</mark>   £0.765 x 100
= 76.5
=£76.50

1% = 78.03 ÷ 102

= £0.765
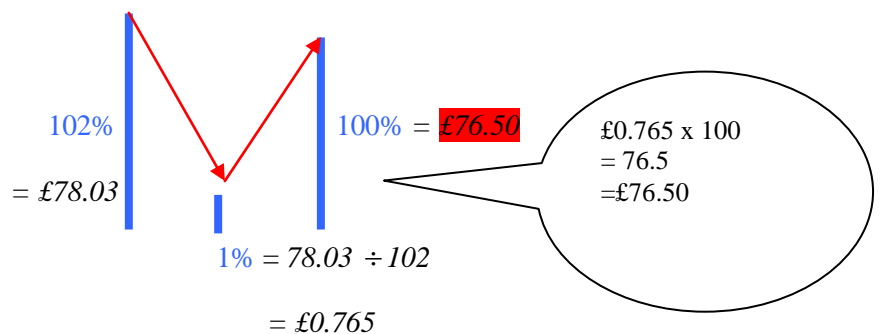
(Do not round here) **(3)**

10-4-10	**Year 11 mathematics: holiday revision** **Non-Calculator Answers**	**DAY 2**

3. In the year 1900, estimates were made of the numbers of three types of whales.

The estimates were made again in 1993.

The information for the Sei Whales is not shown on the diagram.

(a) Find the following fraction, giving your answer in its simplest form.

$$\frac{\text{Number of Blue Whales in 1993}}{\text{Number of Blue Whales in 1900}}$$

$$\overset{\div 100 \quad \div 4}{\frac{400}{200000} = \frac{4}{2000} = \frac{1}{500}}$$

$$\div 100 \quad \div 4$$

(1)

(b) Calculate the percentage decrease in the number of Fin Whales between the years 1900 and 1993.

The amount of whales decreased = *500 000 – 140 000 = 360 000*

$$Percentage\ decrease = \frac{Decrease}{Original}\ x\ 100\% = \frac{360000}{500000}\ x\ 100\%$$

$$= \frac{36}{50}\ x\ 100\% = \frac{72}{100}\ x\ 100\% = 72\%$$

(3)

(c) The ratio of Sei Whales for 1900 to Sei Whales for 1993 is 5 : 1.
The combined total of these whales for the two years was 300 000.
How many Sei Whales were estimated in 1900?

Total number of parts = 5 + 1 = 6 parts

300 000 whales shared between 6 parts

$$= \frac{300000}{6} = 50\ 000\ whales\ per\ part,\ so\ 1\ part\ represents\ 50\ 000$$

1900 represents 5 parts   5 parts = 5 x 50 000 = 250 000 whales

(2)

| 10-4-10 | **Year 11 mathematics: holiday revision Calculator Answers** | **DAY 2** |

4. James invests £730 for 2 years at 12% per year compound interest.
How much interest does he earn?

There are two ways you can tackle this. First you must understand that

compound interest means that interest compounds – builds up

The long way of doing this!

Find 12% of £730 $= \dfrac{12}{100}$ *x 730*

$= 0.12 \ x \ 730 = 87.6 = £87.60 \ (Not \ £87.06)$

So after 1 year there is £87.60 interest + £730 in the bank = £817.60

So for the second year we need to find the interest accrued on £817.60

Next Find 12% of £817.60 $= \dfrac{12}{100}$ *x 817.6*

$= 0.12 \ x \ 817.6 = 98.112 = £98.11$

So after 2nd year there is £98.11 interest + £817.60 in the bank

Total interest = £87.60 + £98.11 = £185.71

The hard to understand but easy way to calculate

If you increase an amount by £730 by 12%

£730 is 100% of the money, 12% is the interest added on to the 100%

We need to find 100% +12% = 112%

112% = $\dfrac{112}{100}$ *= 1.12*   *So*   *112% of £730 = 1.12 x 730*

If we do this for two years we find   *1.12 x 1.12 x £730 or **1.12^2 x 730***

= £915.71 (Amount in bank)

Therefore the interest = £915.71 - £730 = £185.71

(2)

10-4-10	Year 11 mathematics: holiday revision Non-Calculator Answers	DAY 3

5.   Yogurt is sold in small pots and large pots.

(a)   A small pot costs 20 pence.
A large pot costs 150% **more.**
How much does a large pot cost?

Need to find what 150% of 20 pence is

100% of 20 pence is 20 pence

50% of 20 pence is 10 pence

So 150% of 20 pence is 30 pence

Answer 30 pence

(2)

(b)   The ratio of the weight of a small pot to the weight of a large pot is 3 : 11.
The weight of a small pot is 120 g.

What is the weight of a large pot?

Information we have is that 3 parts of small pot : 11 parts of large pot

120 g is weight of small pot = 3 parts

$$= \frac{120}{3} = \text{40 g per part, so 1 part represents 40 g}$$

Large pot represents 11 parts

11 parts = 11 x 40 g = 440 g

Answer is 440 g

(3)

(c)   The weight of a small pot is correct to the nearest gram.

What is the minimum weight of a small pot?

Weight of small pot = 120g

            119.5   *120*   *120.5*

*Help – Because the weight has been calculated to the nearest gram then
there needs to be 1 gram difference between then minimum and maximum
values*

This means that there needs to be 0.5 g either side of the 120 g

119.5 g minimum, 120.5 g maximum   Answer 119.5 g

(1)

10-4-10	**Year 11 mathematics: holiday revision** **Calculator Answers**	**DAY 3**

6. Work out:

(a) i) $\frac{5}{8}$ of £9.60

$\frac{5}{8} = 5 \div 8$ *'of' means '×'*   *£9.60 = 9.6*

Calculator sequence (5 ÷ 8) × 9.6 = 6 = £6.00

Remember to include the correct units in your answers e.g. £, metres etc

iii) 24% of 35 metres.

Remember percentage means 'out of 100'

$24\% = \frac{24}{100} = 24 \div 100 = 0.24$ *'of' means '×'*

Calculator sequence (24 ÷ 100) × 35 = 8.4 metres

(b) Change $\frac{3}{8}$ into

iii) a decimal fraction,

$\frac{3}{8} = 3 \div 8 =$ 0.375 *(a decimal fraction is a decimal number)*

iv) a percentage.

Remember percentage means 'out of 100'

$\frac{3}{8} = 3 \div 8 =$ 0.375

To convert a decimal fraction to a percentage simply $\times 100$ or

using place value know that $0.375 = 375$ thousandths $= \frac{375}{1000} = \frac{37.5}{100} =$ 37.5%

(4 marks)

| 10-4-10 | **Year 11 mathematics: holiday revision**
Non-Calculator Answers | **DAY 4** |

7.
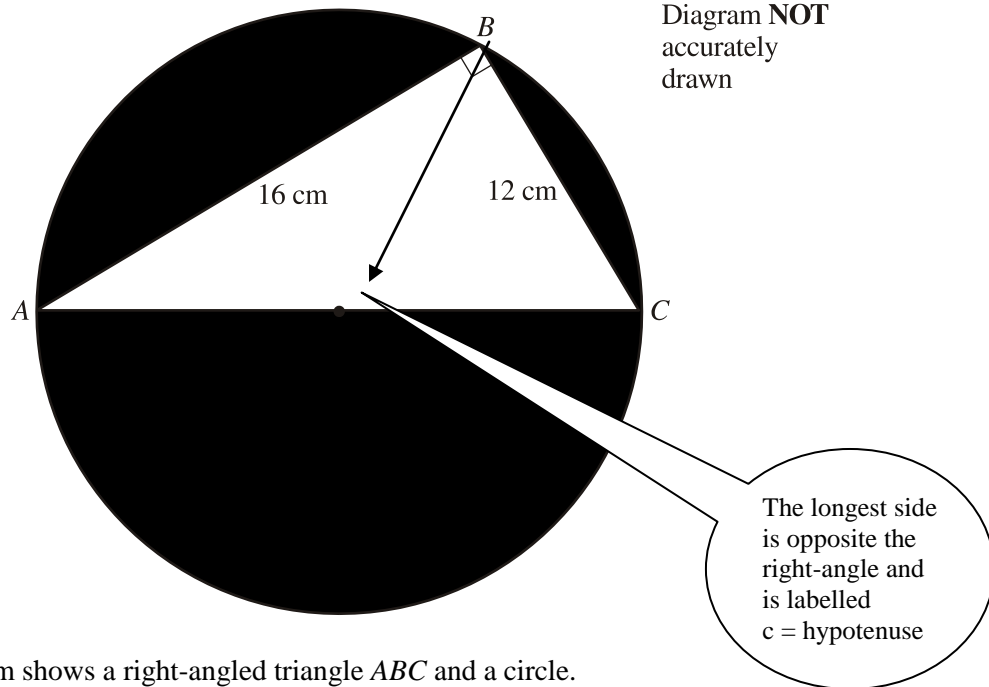
Diagram **NOT** accurately drawn

The longest side is opposite the right-angle and is labelled c = hypotenuse

The diagram shows a right-angled triangle *ABC* and a circle.
A, *B* and *C* are points on the circumference of the circle.

AC is a diameter of the circle.
Using Pythagoras find the length of the diameter AC.

Pythagoras' Rule states that $a^2 + b^2 = c^2$
Remember that c is the longest side (hypotenuse) and is opposite the right-angle; in this example c must equal the diameter AC. It does not matter how you label the other two sides
Let AB = a so $a^2 = 16^2 = 16 \times 16 = ?$
$16 \times 10 = 160$
$16 \times 6 = (10 \times 6) + (6 \times 6) = 96$
$16 \times 16 = 160 + 96 = 256$

Let BC = b so $b^2 = 12^2 = 12 \times 12 = 144$

Using Pythagoras' Rule $a^2 + b^2 = c^2$ $256 + 144 = 400 = c^2$ $c = \sqrt{400} = \sqrt{20 x 20} = 20$

Therefore Diameter AC = 20 cm, *so radius = 10 cm*
Given π is approximately 3.14, Calculate the area of the shaded part of the circle.

Area of circle = $\pi r^2 = 3.14$ x 10 x 10 = 3.14 x 100 = 314 cm^2

Area of triangle = $\dfrac{bxh}{2} = \dfrac{12x16}{2} = \dfrac{192}{2} = 96$ cm^2

Shaded Area = Area of circle – Area of triangle = 314 cm^2 - 96 cm^2 = 218 cm^2

(6 marks)

10-4-10	**Year 11 mathematics: holiday revision** **Calculator answers**	**DAY 4**

8. Sidney places the foot of his ladder on horizontal ground and the top against a vertical wall. The ladder is 16 feet long.
The foot of the ladder is 4 feet from the base of the wall.

> The longest side is opposite the right-angle and is labelled c = hypotenuse

(a) Work out how high up the wall the ladder reaches.
Give your answer to 3 significant figures.

Pythagoras' Rule states that $a^2 + b^2 = c^2$
Remember that c is the longest side (hypotenuse) and is opposite the right-angle; in this example c must equal the length of the ladder 16 feet. It does not matter how you label the other two shorter sides

c = 16 feet so c^2 = 16 x 16 = 256 ft^2
a = 4 feet so a^2 = 4 x 4 = 16 ft^2

16 Feet

4 Feet

Pythagoras' Rule states that $a^2 + b^2 = c^2$
$$So\ 16 + b^2 = 256$$
$$16 + ? = 256$$
$$16 + 240 = 256$$
$$So\ b^2 = 240$$
$$b = \sqrt{240} = 15.491933\ (write\ down\ all\ the\ calculator\ display\ here)$$
b = 15.5 feet (3 significant figures)

(b) *Work out the angle the base of the ladder makes with the ground.*
Give your answer to 3 significant figures.

> This is the angle we need to find

You will need to remember your trigonometric identities

$$Sin\ x = \frac{Opposite}{Hypotenuse} \qquad Cos\ x = \frac{Adjacent}{Hypotenuse} \qquad Tan\ x = \frac{Opposite}{Adjacent}$$

Label your right-angled triangle O = Opposite, A = Adjacent, H = Hypotenuse
In this example A = 4 feet, H = 16 feet and we have just found O = 15.5 feet.
It is always best to use the values given in the question i.e. A and H

> A = 4 feet
> Adjacent is between the right-angle and angle

$$Cos\ x = \frac{Adjacent}{Hypotenuse} = \frac{4}{16} = 0.25$$

$$x = Cos^{-1}\ \frac{4}{16}$$

(Use inverse Cos function on your calculator)

x = 75.5224878
x = 75.5 degrees (3 significant figures)

(6 marks)

10-4-10	Year 11 mathematics: holiday revision Non-Calculator answers	DAY 5

9. The diagram is a drawing of a triangular prism.
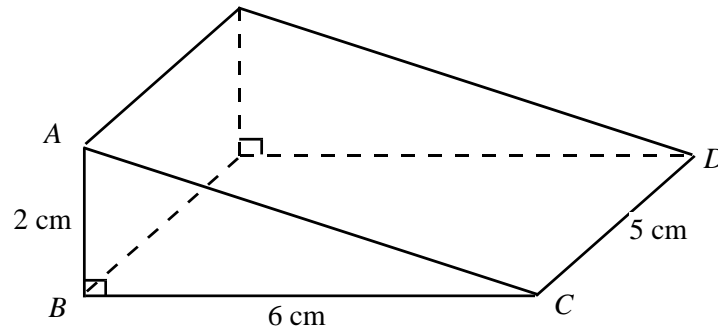
(a) Calculate the area of triangle *ABC*.

Area of triangle ABC is easy to calculate, it is simply half the area of a rectangle measuring 6 cm by 2 cm

$$Area\ of\ triangle = \frac{bxh}{2} = \frac{2x6}{2} = \frac{12}{2} = 6\ cm^2$$

(2)

(b) Calculate the volume of the prism.

Volume of a prism = Area of the cross-section x length

Area of cross section = 6 cm^2

Length = 5 cm
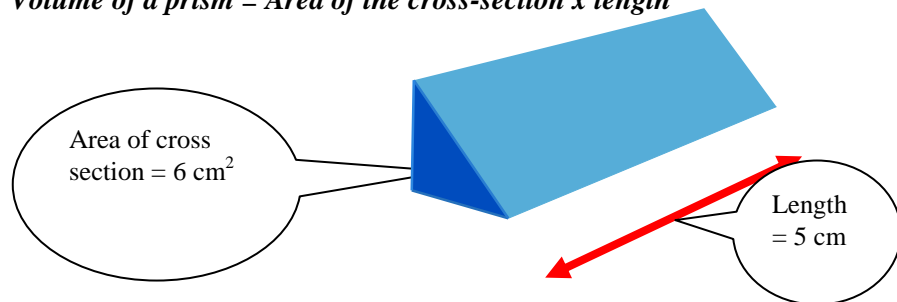
Volume of a prism = 6 cm^2 x 5 cm = 30 cm^3

(2)

Units of volume = cm^3
Area x length
= cm^2 × cm
= cm × cm × cm = cm^3

10-4-10	**Year 11 mathematics: holiday revision** **Calculator answers**	**DAY 5**

10. The diagram shows a cylinder.
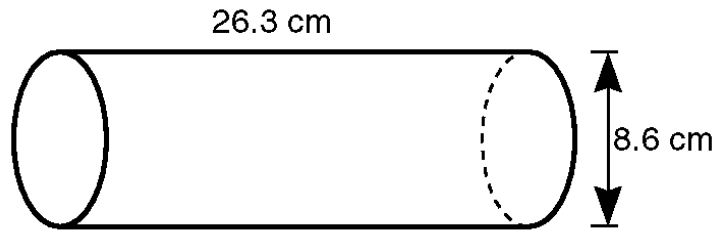
Diagram **NOT**
accurately drawn

26.3 cm

8.6 cm

The height of the cylinder is 26.3 cm.

The diameter of the base of the cylinder is 8.6 cm.

Calculate the volume of the cylinder.
Give your answer correct to 3 significant figures.

Area of cross section
= Area of circle
= $\pi \, r^2$

Length
(Height)
= 26.3 cm
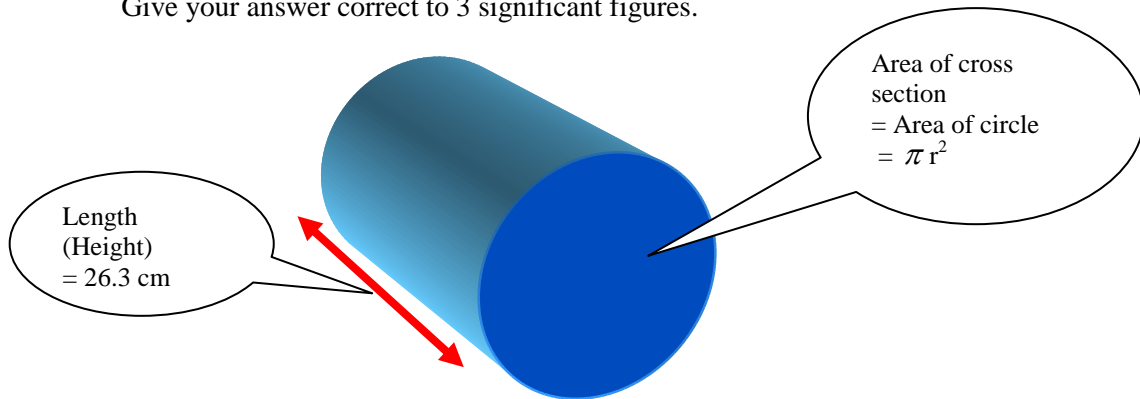
A cylinder is a prism and the two end faces (cross section) are circles

Volume of a prism = Area of the cross-section x length
$$= \pi \, r^2 \times 26.3$$
$$= \pi \times 4.3 \times 4.3 \times 26.3 = 1527.716$$
$$= \textit{1530 cm}^3 \textit{(3 sig. figs)}$$

diameter = 8.6 cm
radius = 4.3 cm

(4 marks)

10-4-10	Year 11 mathematics: holiday revision Non-Calculator answers	DAY 6

11. (a) The triangle has angles $x°$, $2x°$ and $84°$ as shown.
Find the value of x.

84°
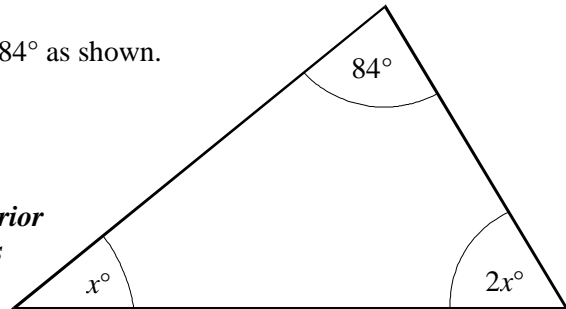
Not drawn accurately

Angle fact: The sum of the interior angles in a TRIANGLE is 180°

$x°$

$2x°$

$x° + 2x° + 84° = 180°$
$3x° + 84° = 180°$

Subtract 84° from both sides to eliminate 84° from RHS
84° - 84° = 0

$3x° = 180° - 84°$
$3x° = 96°$

Divide both sides by 3

$x° = \dfrac{96}{3}$

x = 32 degrees

(3)

(b) $5(2x - 1) = 35,$
$5(2x - 1)$ means 5 lots of $(2x - 1) = 10x - 5$

or $(2x - 1)+(2x - 1)+(2x - 1)+(2x - 1)+(2x - 1) = 10x - 5$

$10x - 5 = 35$

Add 5 to both sides to eliminate -5 from LHS
-5 + 5 = 0

Divide both sides by 10

$10x = 35 + 5$

$10x = 40$

$x = \dfrac{40}{10}$

x = 4

First chose the side with least number of x's (RHS)
We need to eliminate
-2x from RHS so we will add 2x to both sides
-2x + 2x = 0

(c) $4x + 3 = 18 - 2x.$

$4x + 3 + 2x = 18$

Divide both sides by 6

$6x + 3 = 18$

$6x = 18 - 3$

Subtract 3 from both sides to eliminate 3 from LHS
3 - 3 = 0

$6x = 15$

$x = \dfrac{15}{6}$ (You **can** leave your answer like this) 0r x = 2.5

(2)

10-4-10	Year 11 mathematics: holiday revision Calculator answers	DAY 6

12. The angles of a quadrilateral are 73°, 2*x*°, 3*x*° and 102°.

73°

102°

Not drawn accurately

3*x*°

2*x*°
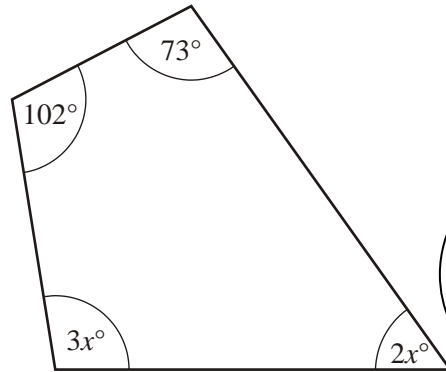
To remember this angle fact, think of a square, another 4 sided polygon. The sum of its interior angles is
4 x 90° = 360°

(b) Write down an equation in *x*.

Angle fact: The sum of the interior angles in a QUADRILATERAL is 360° (A quadrilateral is a 4 sided polygon)

$$3x° + 2x° + 102° + 73° = 360°$$
$$5x° + 175° = 360°$$

$$5x° = 360° - 175°$$
$$5x° = 185°$$
$$x° = \frac{185}{5}$$

Subtract 175° from both sides to eliminate 175° from LHS
175° - 175° = 0

Divide both sides by 5

x = 37 degrees

(2)

(b) Use your equation to find the largest angle in the quadrilateral.

Largest angle = 3x° = 3 × 37° = 111°

Answer 111 degrees

(3)

(c) Solve

$$\frac{q}{3} = -7.4$$

Multiply both sides by 3
-7.4 x 3 = -22.2

Rules for multiplying and dividing negative and positive numbers

Answer q = -22.2

×/÷	+	-
+	+	-
-	-	+

(2)

10-4-10	Year 11 mathematics: holiday revision Non-Calculator answers	DAY 7

13. (a) Simplify

$$10d + 3e - 2d - 7e$$

Collect together like terms. What have we got?

+3e   -7e   +10d   -2d

(Remember the sign of the term is in front of the term)

Answer is 8d - 4e or -4e + 8d

(2)

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

Use the method you are most comfortable with such as FOIL, Smiley face etc. The method shown here is the grid method

×	2x	-3
3x	$6x^2$	-9x
+5	+10x	-15

Remember rules for multiplying and dividing negative and positive numbers

Collect together like terms: $6x^2 -9x + 10x -15$

Answer $6x^2 + x - 15$

(3)

(ii) Multiply out and simplify $(n + 3)^2$

If $3^2 = 3 \times 3$ then $(n + 3)^2 = (n + 3) \times (n + 3)$

×	n	+3
n	n^2	+3 n
+3	+3 n	+9

Collect together like terms $n^2 +3 n +3 n+9$

Answer $n^2 + 6 n + 9$

(3)

(c) Simplify

When multiplying – ADD powers
When dividing – SUBRACT powers

(i) $y^4 \times y^{-3} = y^1 = y$

(ii) $y^4 \div y^5 = y^{-1} (= \dfrac{1}{y})$

10-4-10	Year 11 mathematics: holiday revision Calculator answers	DAY 7

14. (a)   Expand and simplify

$$x(2x - 3) + 4(x^2 + 1)$$

$$x(2x - 3) = 2x^2 - 3x \qquad 4(x^2 + 1) = 4x^2 + 4$$

Collect together like terms

Answer $6x^2 - 3x + 4$

(3)

(b)   Factorise $4c + 64$

$4c = 4 \times c$ $64 = 4 \times 16$

4 is common to both terms and is the highest common factor (HCF), so this can be taken outside the bracket

$4c \div 4 = c$
$64 \div 4 = 16$
So c + 16 goes inside the bracket
Double check by expanding the bracket in your answer

Answer $4(c + 16)$

(1)

(c)   Factorise $x^2 + 5x$

$x^2 = x \times x$ $5x = 5 \times x$

x is common to both terms and is the HCF, so this can be taken outside the bracket

Answer $x(x + 5)$

(2)

(d)   Factorise

$8x^3y^2 - 4xy^3$

$8x^3y^2 = 4 \times 2 \times x \times x \times x \times y \times y$

$4xy^3 = 4 \times x \times y \times y \times y$

$4xy^2$ is common to both terms, and is the HCF, so this can be taken outside the bracket

What is common to both terms? $4 \times x \times y \times y$

Answer $4xy^2 (2x^2 - y)$

(2)

10-4-10	Year 11 mathematics: holiday revision Non-Calculator answers	DAY 8

15. James plants some sunflower seeds.

He plants two seeds in each pot.   The probability that a seed grows is $\frac{4}{5}$

The probability tree diagram shows the outcomes for the two seeds in a pot.

(a) Complete the probability tree diagram.

First seed   **Second seed**

$\frac{4}{5}$ — Grow

Probabilities sum up to 1, so each pair of branches add up to 1
$\frac{4}{5}+\frac{1}{5}=\frac{5}{5}=1$

$\frac{4}{5}$ — Grow

$\frac{1}{5}$ — Not grow

$\frac{1}{5}$ — Not grow

$\frac{4}{5}$ — Grow

$\frac{1}{5}$ — Not grow

(2)
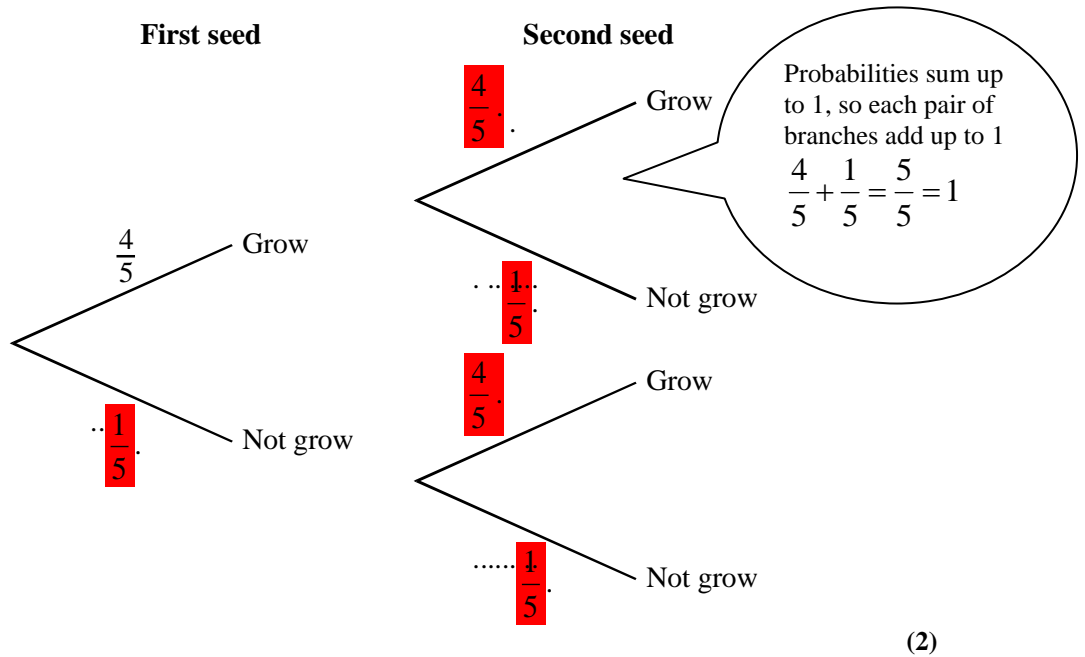
(b) (i) What is the probability that both seeds grow?

In words: First seed grows AND second seed grows

Using probability

Remember AND means ×

$\frac{4}{5}\times\frac{4}{5}=\frac{16}{25}$

(2)

(ii) What is the probability that at least one seed grows?

In words; First seed grows AND second seed does not grow

OR First seed does not grow AND the second seed grows OR Both seeds grow

Using probability

$\frac{4}{5}\times\frac{1}{5}$ + $\frac{1}{5}\times\frac{4}{5}+\frac{4}{5}\times\frac{4}{5}=\frac{24}{25}$

Remember
AND means ×
OR means +

(2)

10-4-10	Year 11 mathematics: holiday revision Calculator answers	DAY 8

16(i). Ruth made a spinner with three colours, green, blue and red.
She tested it by spinning it 500 times.

Her results were

227 landed on green
176 landed on blue
97 landed on red.
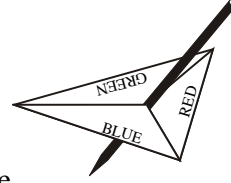
(a) Estimate the probability of the spinner landing on blue.

176 out of 500 is written as a fraction $\dfrac{176}{500}$ (2)

(b) In a game, the spinner is used 100 times.
How many times would you expect the spinner to land on blue?

$$\frac{176}{500} = \frac{?}{100}$$

$\div 5$

176 ÷ 5 = 35.2 which is roughly 35 times

(2)

16(ii). (a) Three cards are numbered 1, 3 and 4. Three discs are numbered 2, 4 and 5.

1	3	4	2	4	5

A game consists of picking one card at random and one disc at random.
The numbers on the card and disc are added together.

Complete the table to show all the possible totals.

Disc

Card		2	4	5
	1	3	5	6
	3	5	7	8
	4	6	8	9

1 + 5 = 6
Etc

(b) What is the probability of getting a total which is an even number?.

Even numbers in grid are 6, 6, 8 and 8 so there are 4 even numbers out of 9 possible numbers. As a fraction this is $\dfrac{4}{9}$

(4)

10-4-10	Year 11 mathematics: holiday revision Non-Calculator answers	DAY 9

17. Write down the *n*th term for each of the following sequences.

(a)   3,   6,   9,   12 ......

+3   +3   +3

This is a linear sequence because the first difference is constant. Term to Term rule is +3

Try 3n   3   6   9   12

The nth term is $3n$

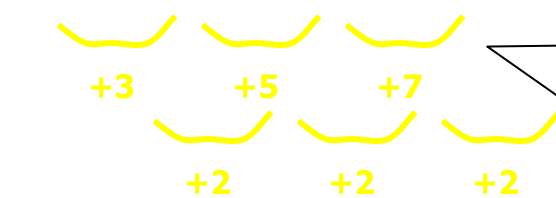**(1)**

(b)   1,   4,   7,   10 ......

+3   +3   +3

Try 3n   3   6   9   12

Try 3n-2   1   4   7   10

The nth term is $3n - 2$

(1)

(c)   1,   4,   9,   16, ...

+3   +5   +7

+2   +2   +2

This is a not a linear sequence because the first difference is not constant.

The second difference is constant +2 this means that the sequence is quadratic So we need to consider square numbers i.e. n^2

Try n^2   1   4   9   16

The nth term is n^2

(1)

(d)   4,   16,   36,   64, ...

+12   +20   +28

+8   +8   +8
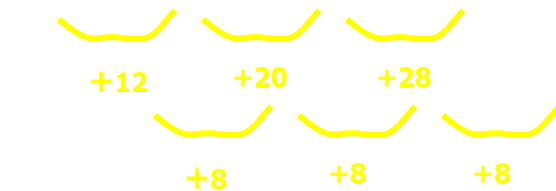
This is a quadratic sequence again so we need to use square numbers i.e. n^2 but because the second difference is +8 we need to use $4n^2$ $(8 \div 2 = 4)$

Try n^2   1   4   9   16

Try $4n^2$ 4   16   36   64

The nth term is $4n^2$ **(2)**

10-4-10	**Year 11 mathematics: holiday revision** **Calculator answers**	**DAY 9**

18. A sequence of numbers is shown below.

The first two terms are 3 and 4.

The remaining terms are found by adding together the two previous terms.

$$3, 4, 7, 11, 18, 29, \ldots$$

(a) Write down the next two terms in the sequence.

18 + 29 = 47   *47 + 29 = 76*   <mark>*47, 76*</mark>

(1)

(b) The numbers from the first sequence are used to find the terms of a second sequence as shown below.

The terms are given to 2 decimal places.

$$4 \div 3 = 1.33$$
$$7 \div 4 = 1.75$$
$$11 \div 7 = 1.57$$

(i) Calculate the next three terms of this second sequence.

18 ÷ 11 = 1.64
29 ÷ 18 = 1.61
47 ÷ 29 = 1.62

(ii) Write down what you notice about the terms in the second sequence.

Terms are decimal numbers and are 1.something. The difference between the terms is decreasing and getting closer to 1.6
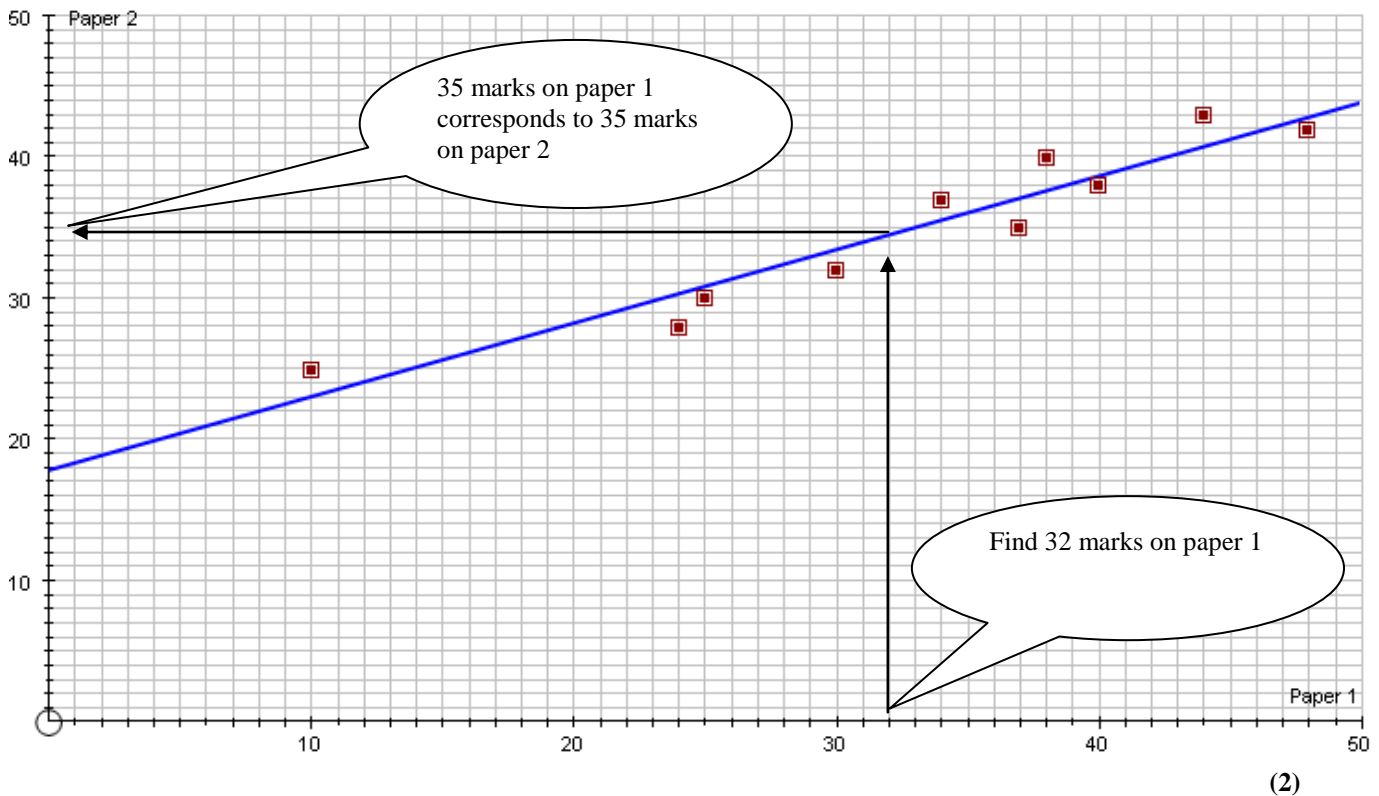
(3)

| 10-4-10 | Year 11 mathematics: holiday revision
Non-Calculator answers | DAY 10 |

19. Ten pupils took two examination papers in Mathematics.

Their marks out of 50 were as follows.

| Paper 1 | 44 | 24 | 40 | 48 | 30 | 25 | 10 | 37 | 38 | 34 |
| Paper 2 | 43 | 28 | 38 | 42 | 32 | 30 | 25 | 35 | 40 | 37 |

(a)   On the grid below draw a scatter diagram of these marks.

(2)

b)   Draw a line of best fit for the points you have plotted.   **(1)**

10-4-10	**Year 11 mathematics: holiday revision** **Non-Calculator answers**	**DAY 10**

(c)   Omar was absent for Paper 2. He scored 32 marks on Paper 1.

    (i)   What mark do you think it fair to give him for Paper 2?

        35 *(this answer will depend on how you have determined your line of best fit)*

    (ii)   State how you got your answer.

        Find 32 on the x-axis (paper 1 mark) draw a vertical line from 32 on the x-axis up to the line of best fit and then a horizontal line from the line of best fit to the y-axis and read off the paper 2 mark from the y-axis.

        (2)

(d)   These pupils also took an examination paper in Art and one in Chemistry.
A scatter diagram of these marks is drawn.
How might it be different from the one drawn for the two Mathematics papers?

There is a strong correlation between the two papers in mathematics; if a child performs well in paper 1 then they generally perform well in paper 2. A scatter diagram showing the marks in Art and Chemistry will show little or no correlation, as pupils performing well in Art might not necessarily perform well in Chemistry and vice versa

        (1)

10-4-10	Year 11 mathematics: holiday revision Calculator	DAY 10

20.   The countries of the world are divided into 'developed' and 'under-developed' countries.

The frequency table shows the distribution of ages for the population in the developed countries.

The figures are percentages and were estimated for the year 1985.

Age (y years)	Percentage of population	Cumulative Percentage
$0 < y \leq 15$	19	*19*
$15 < y \leq 30$	22	*41*
$30 < y \leq 45$	20	*61*
$45 < y \leq 60$	17	*78*
$60 < y \leq 75$	11	*89*
$75 < y \leq 90$	9	*98*
$90 < y \leq 105$	2	*100*

Cumulative percentage is like a 'running total'
19 = 19 + 0
41 = 19 + 22
61 = 41 + 20
78 = 61 + 17
89 = 78 +11
98 = 89 + 9
100 = 98 + 2

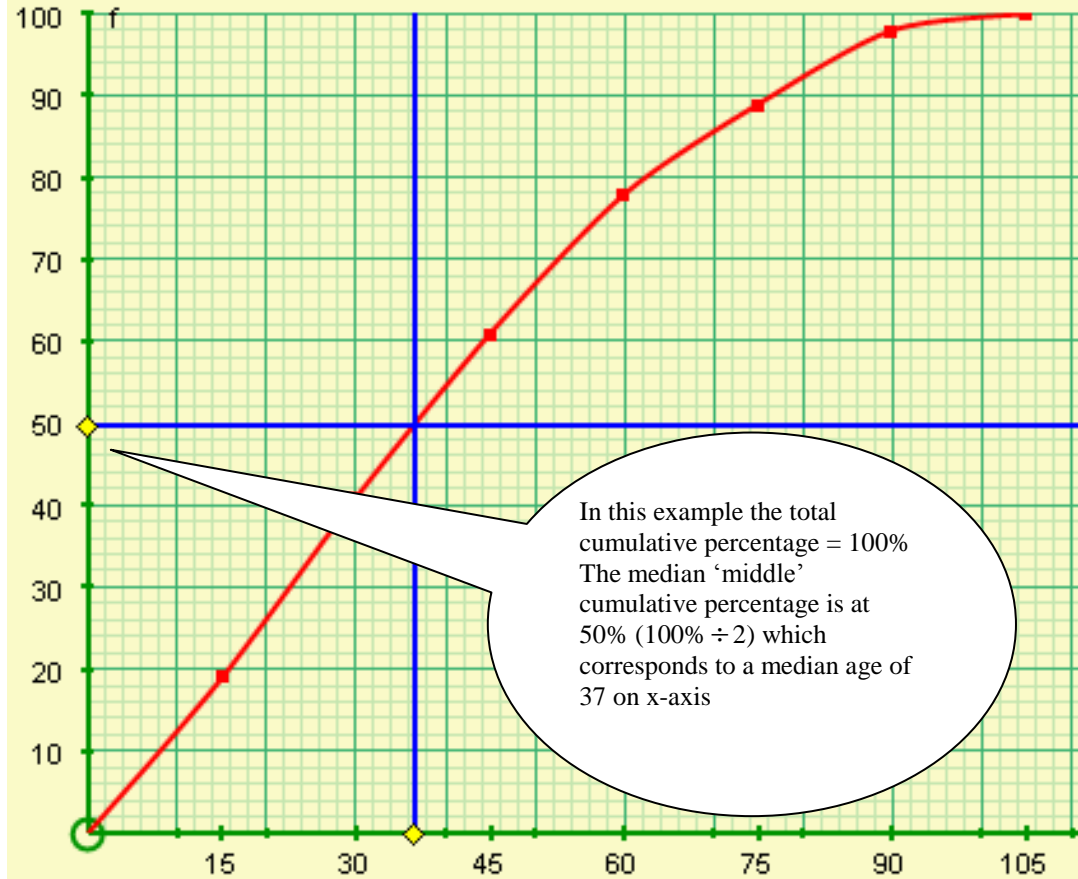| 10-4-10	Year 11 mathematics: holiday revision Calculator answers	DAY 10

(a) Construct a cumulative frequency diagram to show this information.

In this example the total cumulative percentage = 100% The median 'middle' cumulative percentage is at 50% (100% ÷ 2) which corresponds to a median age of 37 on x-axis

(3)

(b) (i) What was the median age for the population in developed countries in 1985?

37

(1)

(ii) The median age for the population in the under-developed countries in 1985 was 21.

What do the medians tell you about the difference between the population in the developed countries and the population in the underdeveloped countries?

People live longer in developed countries compared to those in underdeveloped countries as the median age is greater in developed countries

(2)