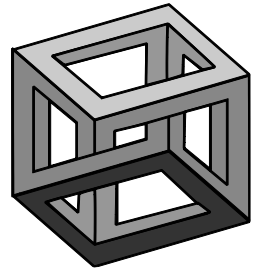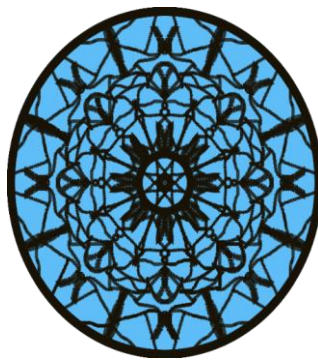Name........................

GCSE Mathematics

Christmas Holiday Revision

20-4-10

20 minutes a day for ten days

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)

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.
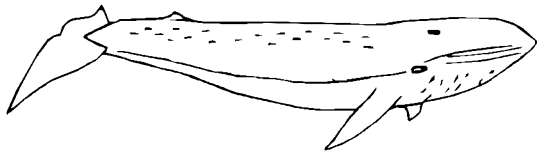What was the State Pension before this increase?

....

....

....

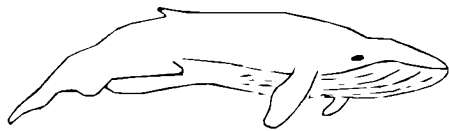Answer £ ....

(3)

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)

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

....

....

....

....

Answer £ ....

(2)

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

(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?
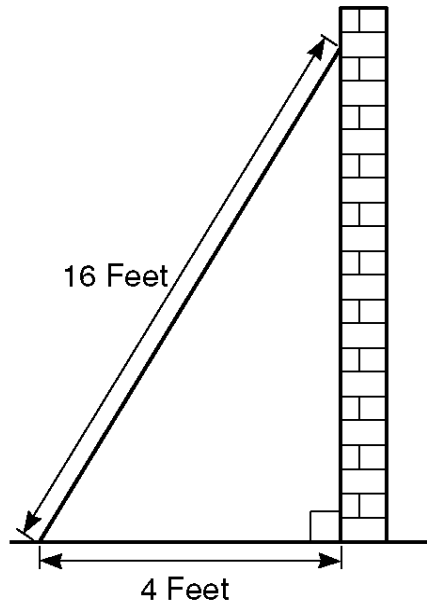
Answer .... g

(1)

20-4-10	Year 10 mathematics: holiday revision Calculator	DAY 3

6. Work out:

(a) i) $\dfrac{5}{8}$ of £9.60

....

....

ii) 24% of 35 metres.

....

....

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

    i)   a decimal fraction,

....

....

    ii) a percentage.

....

....

(4 marks)

7.
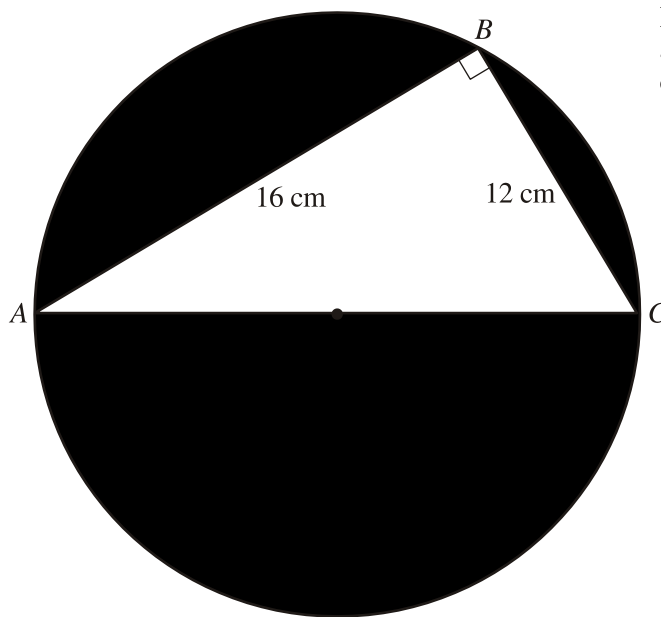
Diagram **NOT** accurately drawn

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.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

(6 marks)

20-4-10	Year 10 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.

…………………………………………………………………………………………

…………………………………………………………………………………………

…………………………………………………………………………………………

(6 marks)

| 20-4-10 | Year 10 mathematics: holiday revision
Non-Calculator | DAY 5 |

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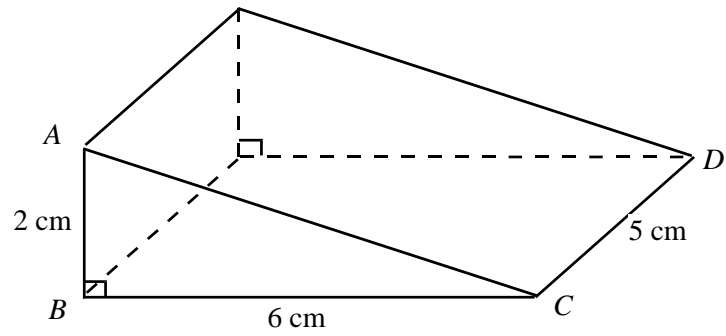
(a) Calculate the area of triangle *ABC*.

....

....

....

(2)

(b) Calculate the volume of the prism.

....

....

....

(2)

10. The diagram shows a cylinder.

Diagram **NOT**
accurately drawn
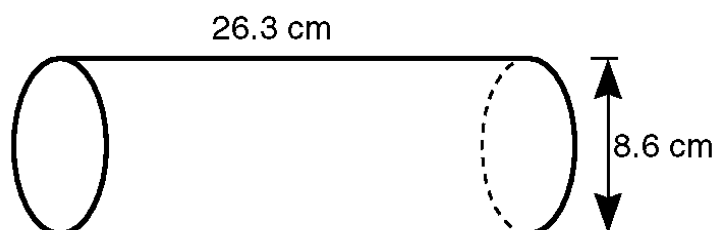
26.3 cm

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)

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

Find the value of x.
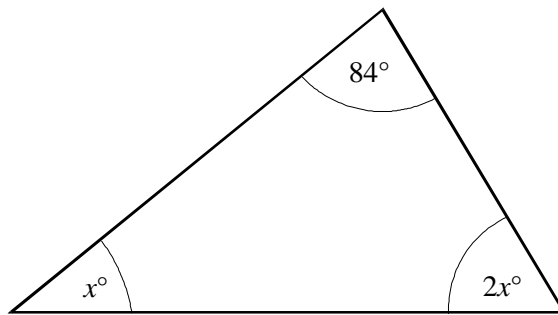
Not drawn accurately

....

....

Answer .... degrees

(3)

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

....

....

(2)

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

....

....

(2)

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

73°

102°

3x°

2x°
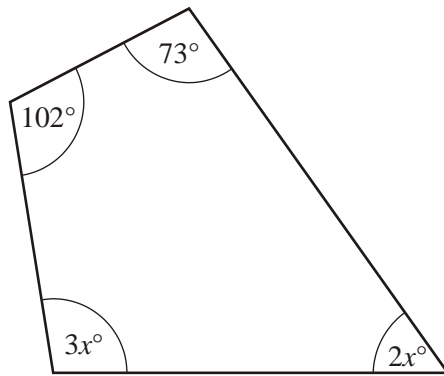
Not drawn accurately

(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)

| 20-4-10 | **Year 10 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)

14. (a) Expand and simplify

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

....@cchristian.......

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

....

....

Answer ....

(3)

(b) Factorise $4c + 64$

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

Answer ....

(1)

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

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

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

Answer ....

(2)

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

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

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

Answer ....

(2)

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**
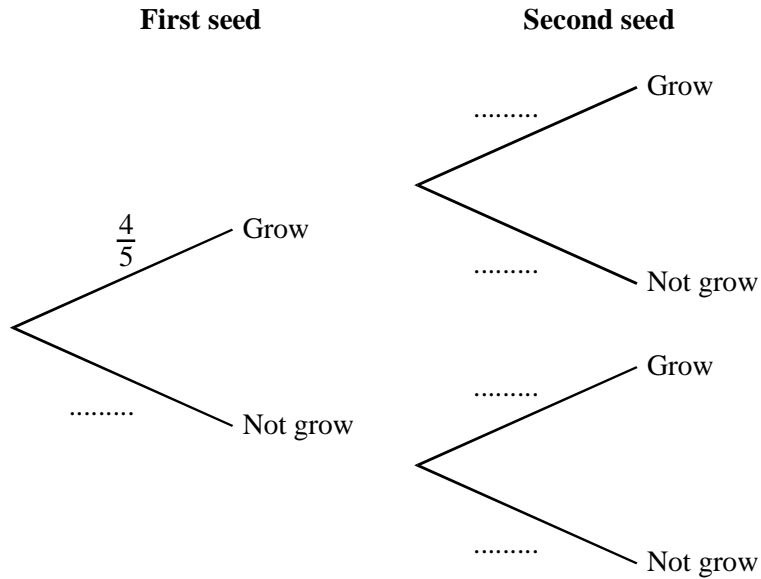
(2)

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

....

....
(2)

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

....

....

....
(2)

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

Her results were
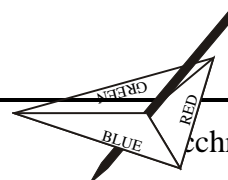
227 landed on green
176 landed on blue
97 landed on red.

(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)

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)

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.

....

(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)

20-4-10	Year 10 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)
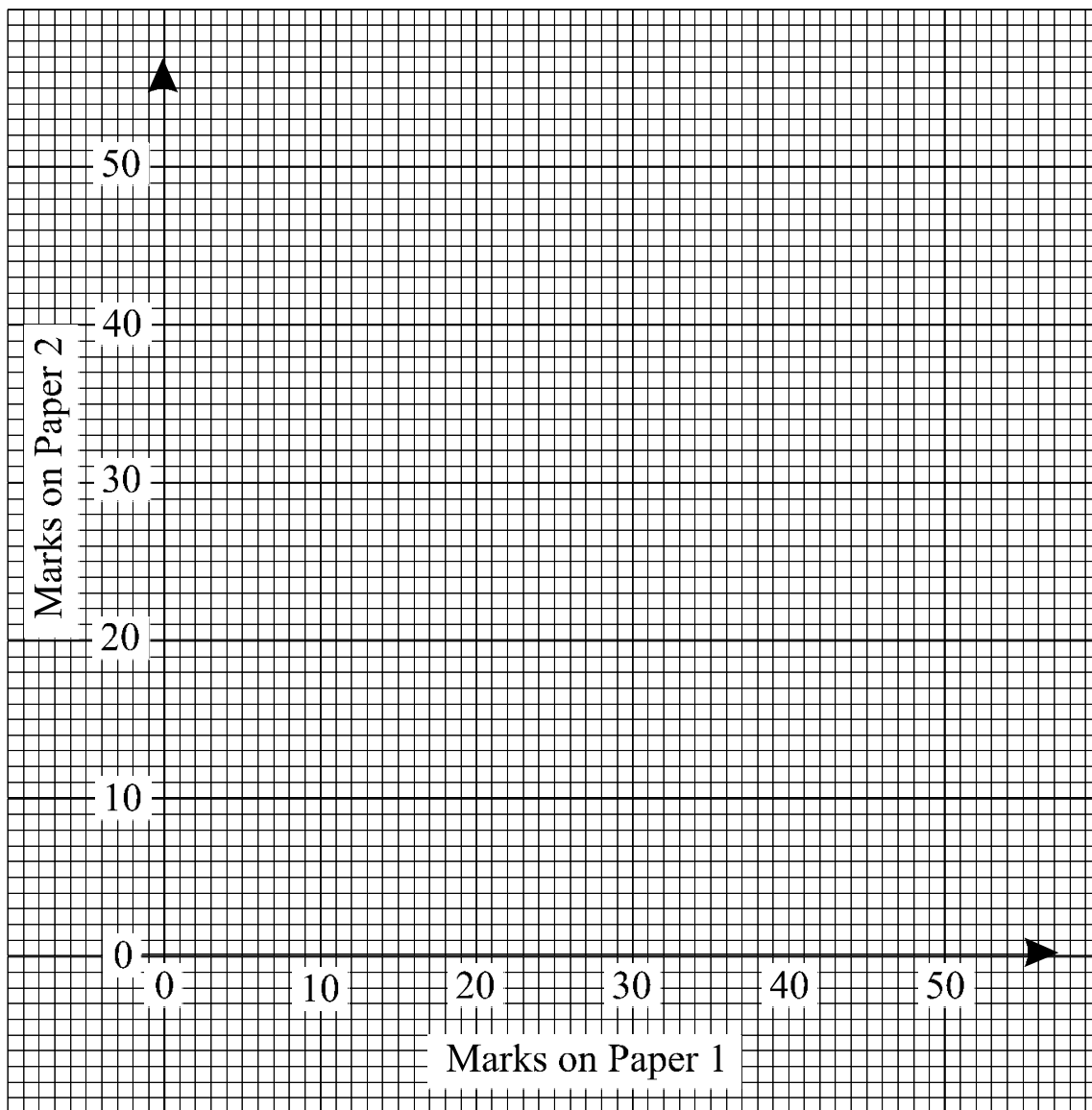
(b)   Draw a line of best fit for the points you have plotted.

(1)

(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)

20-4-10	Year 10 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
$0 < y \le 15$	19	
$15 < y \le 30$	22	
$30 < y \le 45$	20	
$45 < y \le 60$	17	
$60 < y \le 75$	11	
$75 < y \le 90$	9	
$90 < y \le 105$	2	

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

(3)
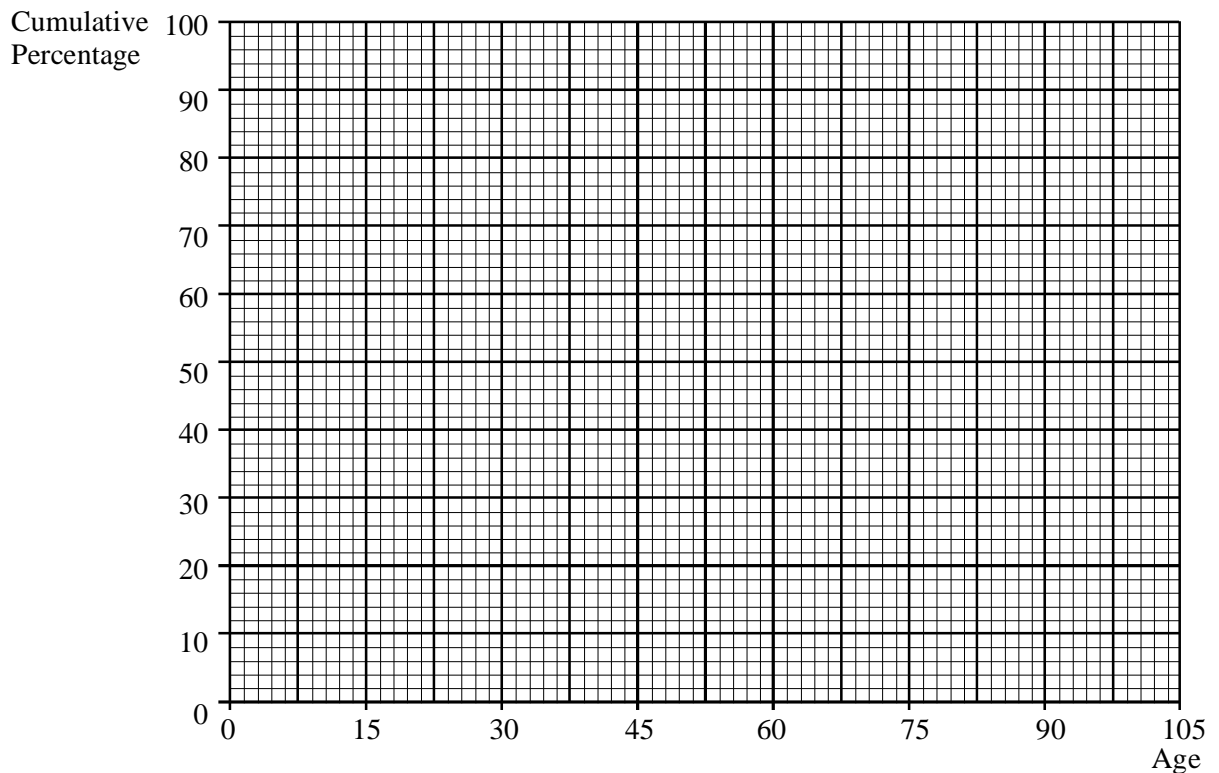
(b) (i) What was the median age for the population in developed countries in 1985?

....

(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)

20-4-10	**Year 10 mathematics: holiday revision Calculator**	**DAY 11**

21. *ABCD* is a trapezium.
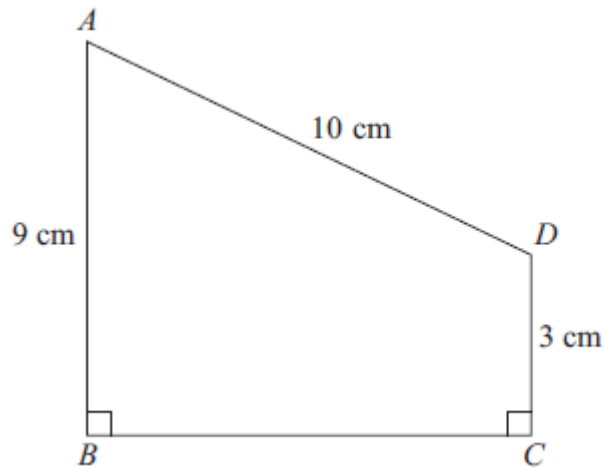
AD = 10 cm
AB = 9 cm
DC = 3 cm
Angle ABC = angle BCD = 90°

Calculate the length of AC.
Give your answer correct to 3 significant figures.

.... cm

(Total 5 marks)

22. The diagram represents a metal frame.
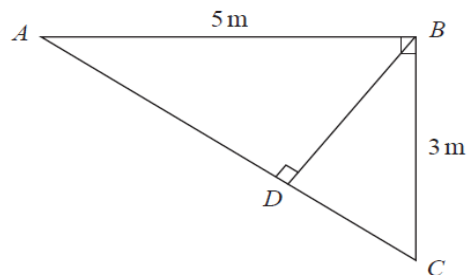
Diagram **NOT** accurately drawn

The frame is made from four metal bars, AB, AC, BC and BD.

Angle ABC = angle ADB = 90°
AB = 5 m
BC = 3 m

Work out the total length of the four metal bars of the frame.
Give your answer correct to 3 significant figures.

....m

(Total 5 marks)

23.   Change 9 cm^2 to mm^2.

.... mm^2

(Total 2 marks)

24.   Here is a triangle ABC.
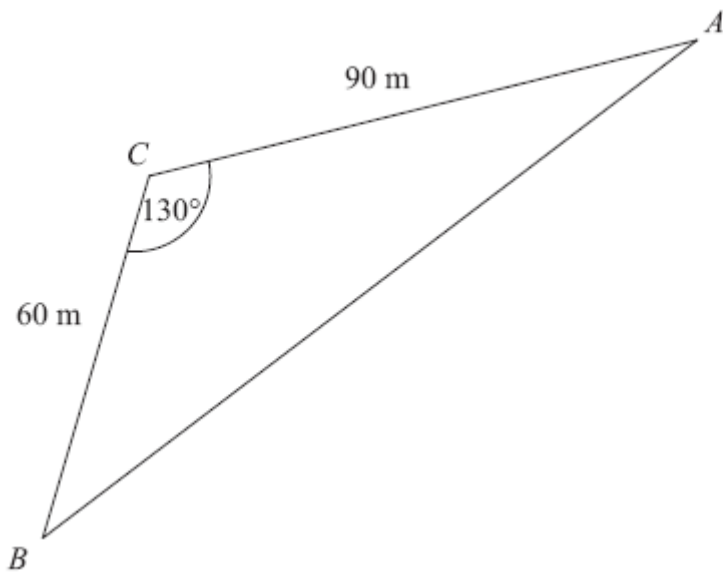
Diagram **NOT** accurately drawn

$AC = 90$ m.
$BC = 60$ m.
Angle $ACB = 130°$.

Calculate the perimeter of the triangle.
Give your answer correct to one decimal place.

.... m

(Total 4 marks)

25. Prove that

$$(2n + 3)^2 - (2n - 3)^2 \text{ is a multiple of } 8$$

for all positive integer values of n.

(Total 3 marks)

26. **A** and **B** are two solid shapes which are mathematically similar.
The shapes are made from the same material.

A

B
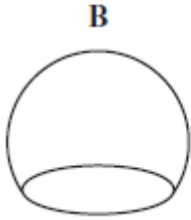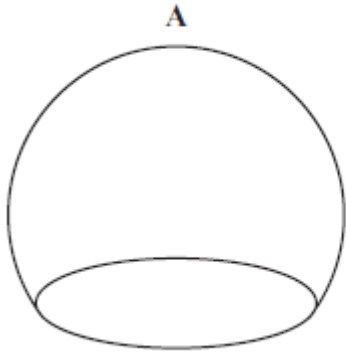
Diagram **NOT** accurately drawn

The surface area of **A** is 50 cm^2.
The surface area of **B** is 18 cm^2.

The mass of **A** is 500 grams.

Calculate the mass of **B**.

.... grams

(Total 4 marks)

27. Solve $$\frac{5(2x+1)^2}{4x+5} = 5x - 1$$

....

(Total 5 marks)

28. Solve the equations

$$x^2 + y^2 = 36$$
$$x = 2y + 6$$

....

(Total 5 marks)

29 Here is a kite.
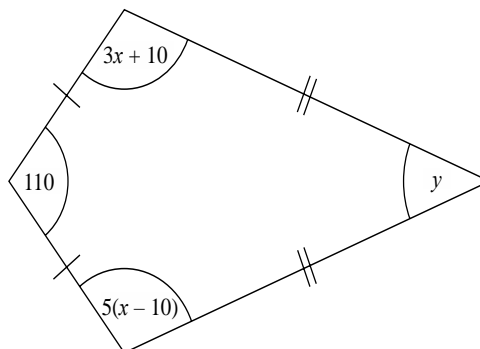
All angles are measured in degrees.

Work out the value of *y*.

30
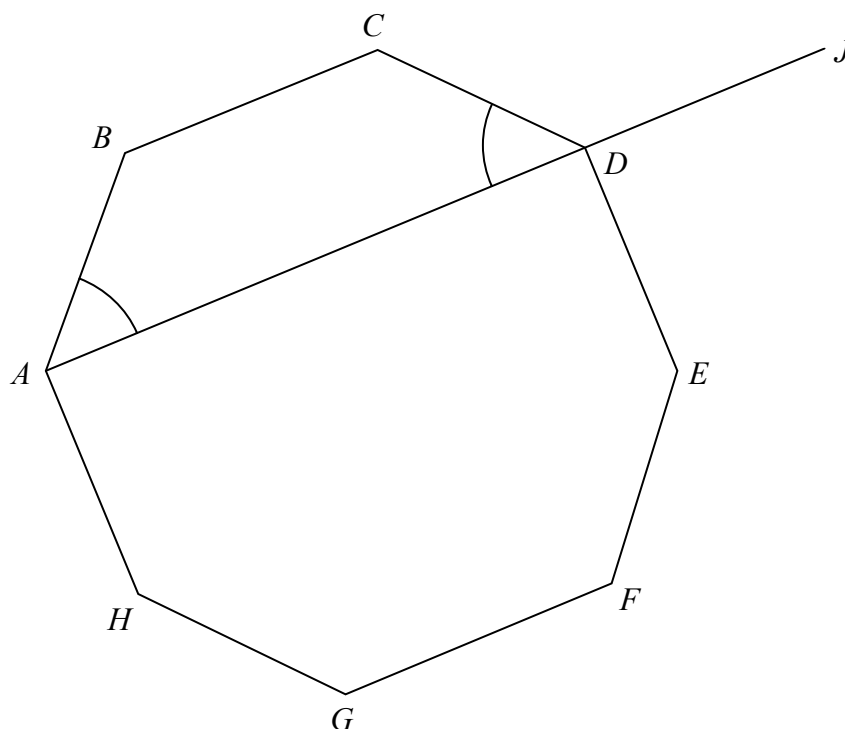
ABCDEFGH is a regular octagon.
ADJ is a straight line.

angle *BAD* = angle *CDA*

Show that angle *CDJ* = 135°

(Total for Question 6 is 4 marks)

20-4-10	Year 10 mathematics: holiday revision Calculator	DAY 16

31 (*a*) Write 0.005 49 in standard form.

....

(*b*) Find the value of $(8 \times 10^3)^2$
Give your answer in standard form.

....
(2)

(*c*) Find the value of $(7.6 \times 10^5) + (8.7 \times 10^4)$
Give your answer in standard form.

....
(2)

(Total for Question 7 is 5 marks)

32 *P* is inversely proportional to the square root of *m*.

$P = 10$ when $m = \dfrac{1}{4}$

Work out the value of *m* when $P = 2$

....
(Total for Question 11 is 3 marks)

33.

The slant height of a cone is 8 cm.
The radius of the cone is 3 cm.
Find the curved surface area of the cone.
Give your answer in terms of π.
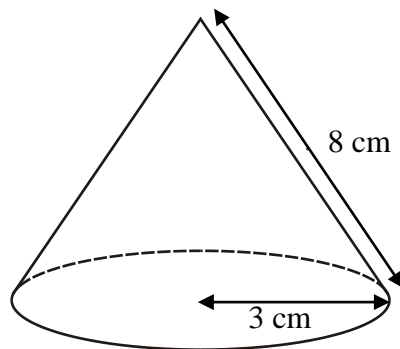
(Total for Question 11 is 3 marks)

34. (a) Show that the equation $\dfrac{5}{x+2} = \dfrac{4-3x}{x-1}$

can be rearranged to give $3x^2 + 7x - 13 = 0$

(3)

(b) Solve $3x^2 + 7x - 13 = 0$
Give your solutions correct to 2 decimal places.

$x =$ .... or $x =$

....

35. Solve the equation $\dfrac{x}{2x-3} + \dfrac{4}{x+1} = 1$

$x =$ ....

(Total 5 marks)

20-4-10	Year 10 mathematics: holiday revision Calculator	DAY 19

36. Mr Watkins needs to buy some oil for his central heating.
Mr Watkins can put up to 1500 litres of oil in his oil tank.
There are already 850 litres of oil in the tank.
Mr Watkins is going to fill the tank with oil.
The price of oil is 67.2p per litre.
Mr Watkins gets 5% off the price of the oil.
How much does Mr Watkins pay for the oil he needs to buy?

£ ....
(Total for Question is 5 marks)

*37.   Jim's pay is £180 each week.
Jim asks his boss for an increase of £20 a week.
Jim's boss offers him a 10% increase.
Is the offer from Jim's boss more than Jim asked for?
You must show your working.
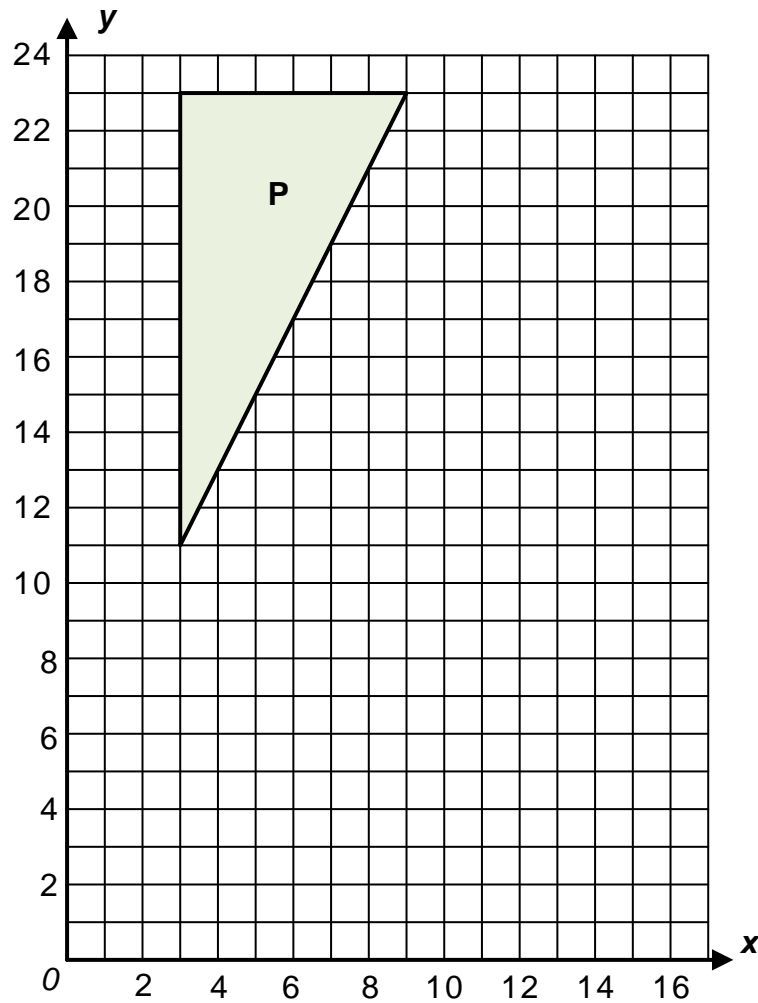
(Total for Question is 3 marks)

37.
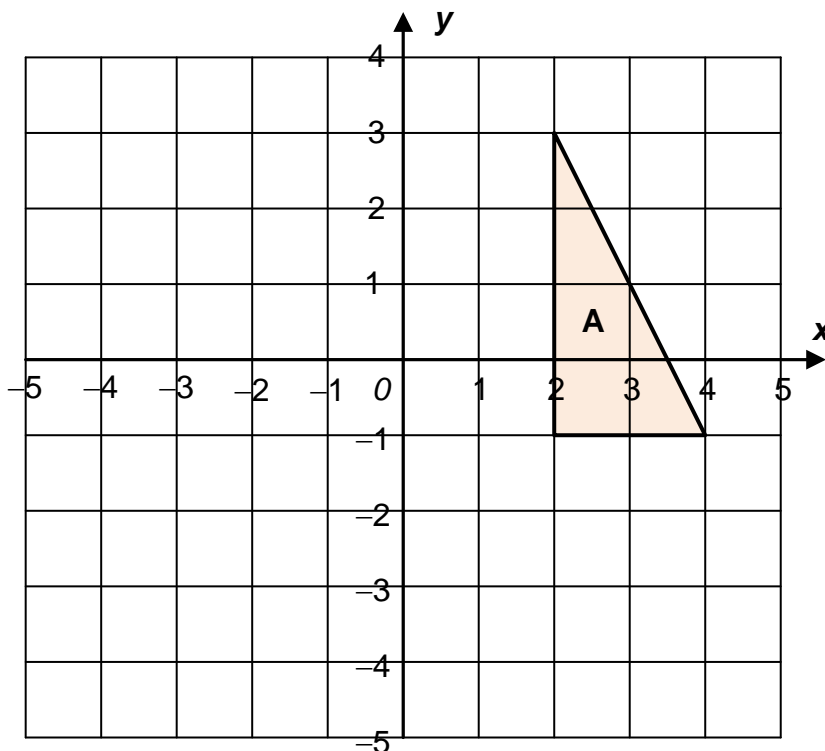
On the grid, enlarge triangle **A** by scale factor $\frac{1}{2}$, centre (−4, −3).

Label your new triangle **B.**

38.
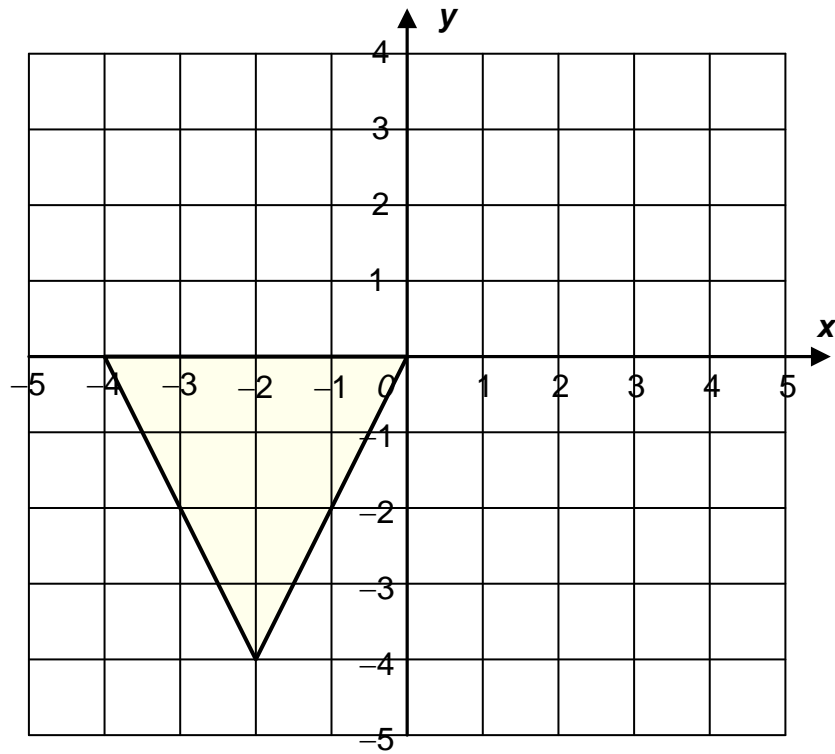
Enlarge the shaded triangle by a scale factor $1\frac{1}{2}$, centre (−4, −4).

39.

On the grid, enlarge triangle **P** by a scale factor of $\frac{1}{3}$, centre (15, 6).

Label the new triangle **R.**

---

40. Each day a company posts some small letters and some large letters.

The company posts all the letters by first class post.

The tables show information about the cost of sending a small letter by first class post and the cost of sending a large letter by first class post.

<div align="center">

Small Letter

Weight	First Class Post
0–100 g	60p

Large Letter

Weight	First Class Post
0–100 g	£1.00
101–250 g	£1.50
251–500 g	£1.70
501–750 g	£2.50

</div>

One day the company wants to post 200 letters.

The ratio of the number of small letters to the number of large letters is 3 : 2.

70% of the large letters weigh 0–100 g.

The rest of the large letters weigh 101–250 g.

Work out the total cost of posting the 200 letters by first class post.

£......................................

(Total 5 marks)

41.
Andrew did a survey at the seaside for his science coursework.
He measured the lengths of 55 pieces of seaweed.
The results of the survey are shown in the table.

Length of seaweed (L cm)	Frequency		
$0 < L \leq 20$	2		
$20 < L \leq 40$	22		
$40 < L \leq 60$	13		
$60 < L \leq 80$	10		
$80 < L \leq 100$	5		
$100 < L \leq 120$	2		
$120 < L \leq 140$	1		

Andrew needs to calculate an estimate for the mean length of the pieces of seaweed.

(a) Work out an estimate for the mean length of the piece of seaweed. Give your answer correct to 1 decimal place.

(b) Write down the interval that contains the median length of a piece of seaweed.

(Total 5 marks)