

MISCELLANEOUS QUESTIONS
NO CALCULATORS

WRITE YOUR ANSWERS, INCLUDING ROUGH WORKING, ON THESE SHEETS

1. a) Calculate 30% of £640.

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b) Red and white paint is mixed in the ratio 5 : 3. If 35 litres of red paint is used, how much white paint will be mixed?

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2. a) A dress is reduced by 20% in a sale. If the sale price of the dress is £160, calculate the original price of the dress.

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b) Timothy's pocket money increased from £2.50 to £3.00 per week. Calculate the percentage increase.

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3. a) Showing your working, obtain an ESTIMATE for the value of $\frac{615 \times 43}{3.1 \times \sqrt{63}}$.

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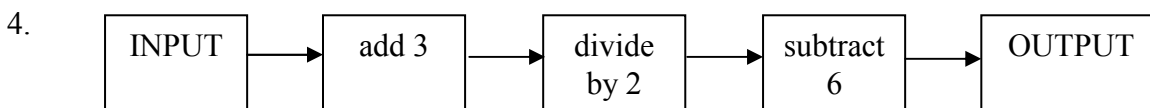
b) A model of a ship is built to a scale of 1 : 40.

i) The height of the real ship is 12 m. How high is the model ship **in cm**?

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ii) The length of the model ship is 50 cm. How long is the real ship **in m**?

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a) Use the above instructions to complete the following table.

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INPUT	OUTPUT
11	1
15	
-1	
	6

b) Letting n stand for the input, write an expression for the output involving n .

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5. a) During the week, a video shop hires videos for £ x each per night. What, in terms of x , is the cost of hiring 3 videos for one night during the week?

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b) The cost of hiring a video tape for one night during the weekend is £1 more than the corresponding price during the week. What, in terms of x , is the cost of hiring 2 videos for one night during the weekend?

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c) Find, in terms of x , the total cost of hiring 3 videos for one night during the week and 2 videos for one night during the weekend. Simplify your answer as far as possible.

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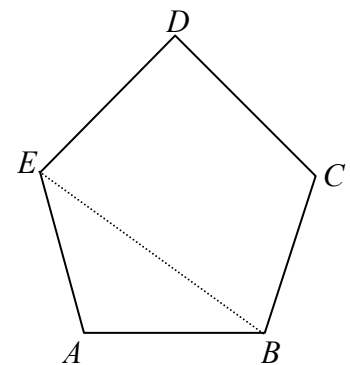
6. The following shows a regular pentagon $ABCDE$.

i) Calculate angle BEA .

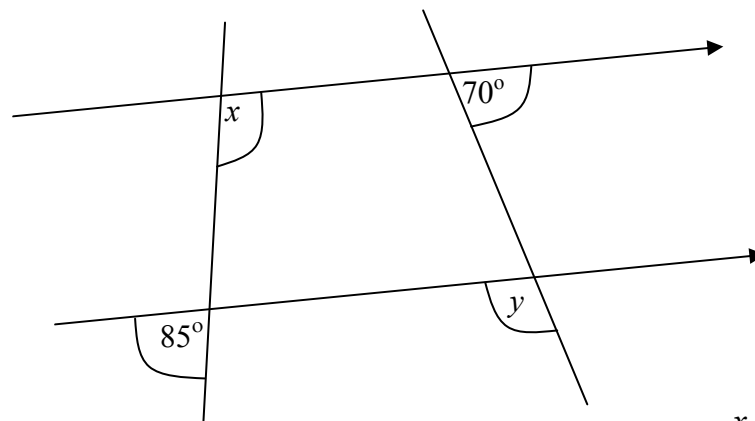
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ii) If point B is due east of A , calculate the bearing of E from B .

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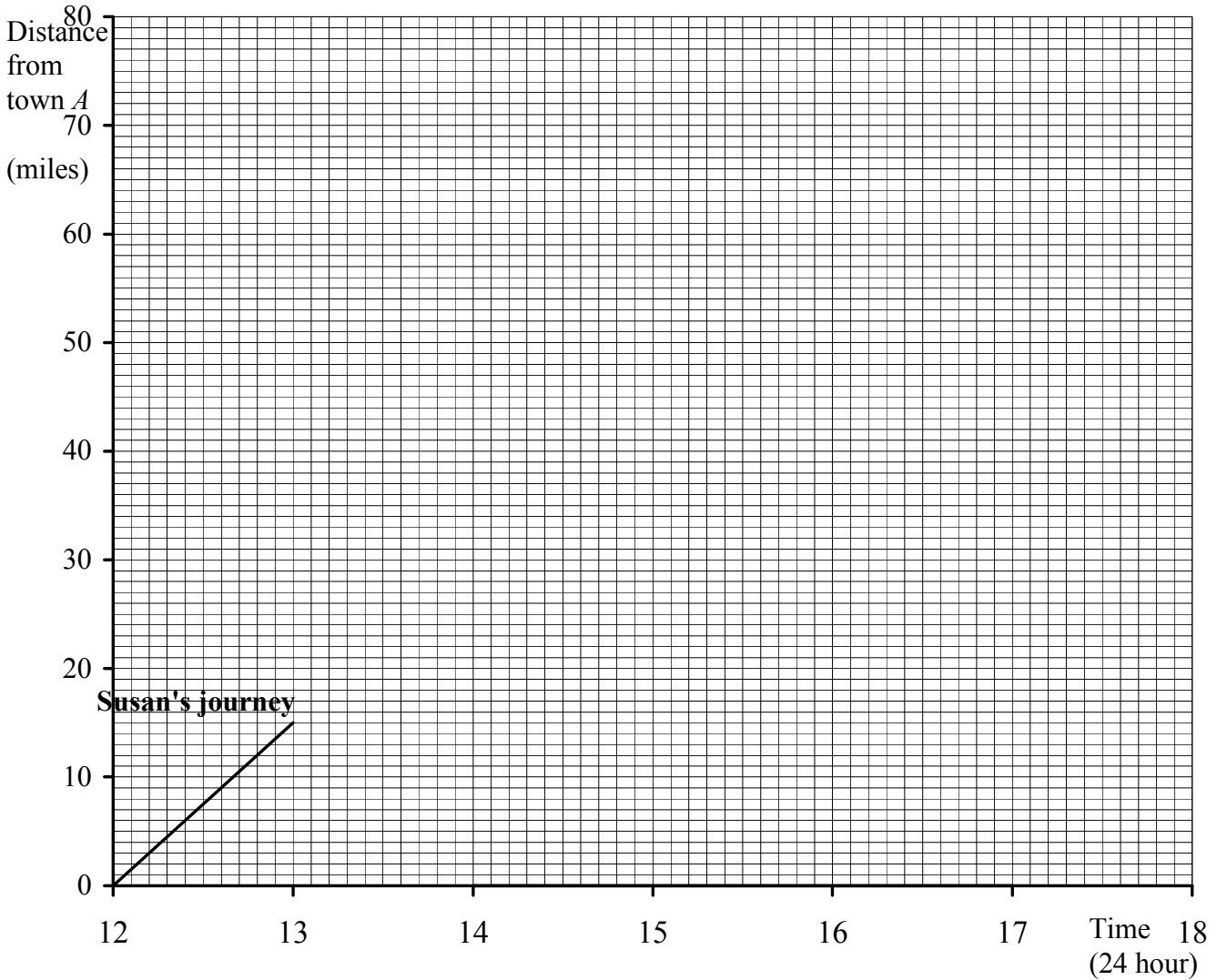
7. Write down the size of the angles marked x , y in the following diagram.



..... $x =$
 $y =$

8. Two towns, A and B , are 60 miles apart. Susan leaves town A at 12:00 p.m. and travels towards B . She travels at 15 mph for 2 hours, and then rests for $1\frac{1}{2}$ hours. She then continues at 20 mph for another hour before resting again for 1 hour. She then takes exactly $\frac{1}{2}$ hour to complete her journey.

a) Complete the travel graph below to illustrate her journey.



- b) What time does Susan arrive at town B ?
- c) How fast does Susan travel in the last $\frac{1}{2}$ hour of her journey?
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Ben leaves town B at 3 p.m. and travels towards town A at a constant 30 mph.

Draw Ben's journey on the above graph.

- d) At what time did Ben arrive at town A ?
- e) At what time did Susan and Ben pass each other?

9. Eight hundred pounds is invested at 8% per annum simple interest for three years. Calculate the amount invested after 3 years.

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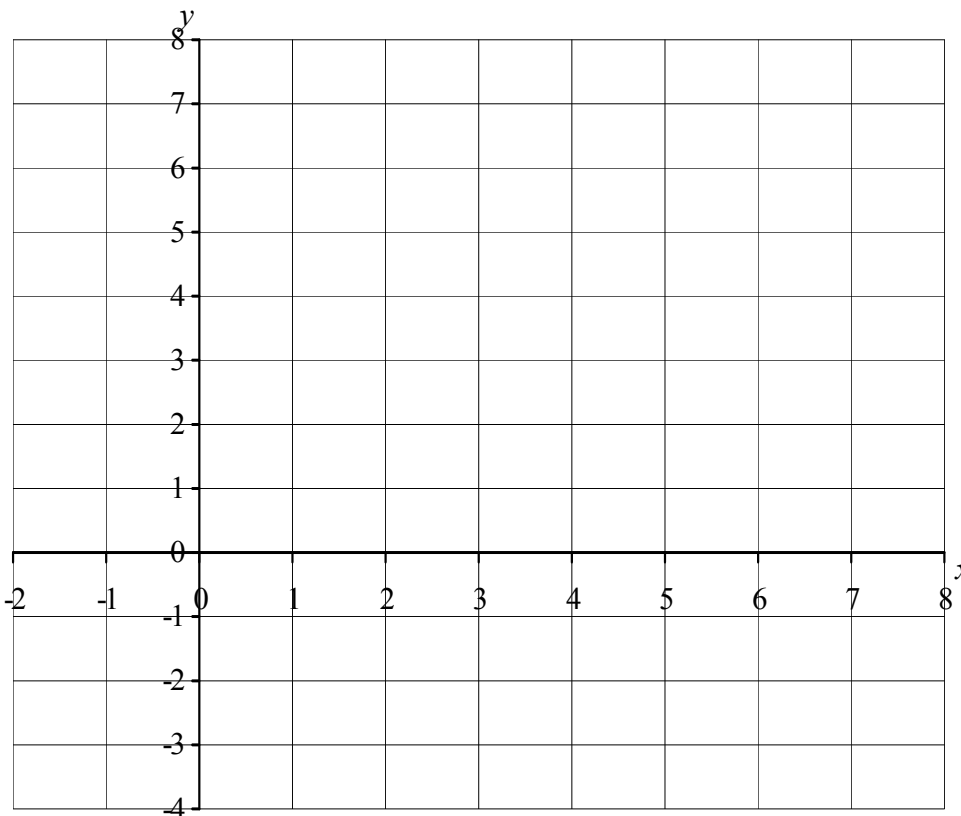
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10. Work out which of $\frac{5}{6}$ or $\frac{7}{9}$ is the largest fraction. **Show your working.**

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11. On the axes below, shade the region given by $x \geq 0$, $y \geq 1$ and $x + y \leq 6$.



12. a) Find the highest common factor of the numbers 24 and 40.

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b) The number 40 expressed as the product of its prime factors in index form is given by $2^3 \times 5$.
 Express 90 as the product of its prime factors in index form.

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c) Use your answer to b) to write 40×90 as the product of its prime factors in index form.
 Simplify your answer.

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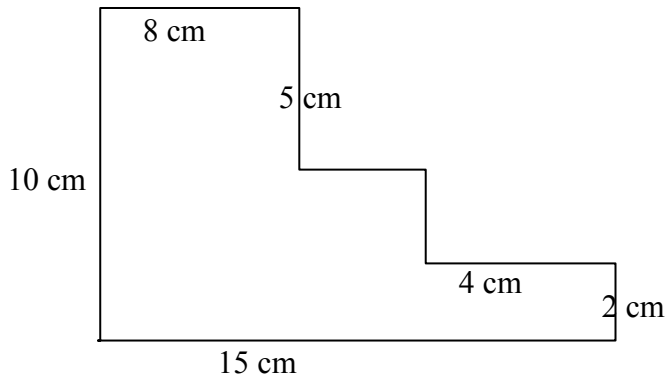
d) Use your answer to c) to write $\sqrt{40 \times 90}$ as the product of its prime factors in index form.

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13. Express the numbers i) 360, ii) 1025.2 and iii) 0.0045 in standard form.

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14.



Clearly indicating the units, calculate

a) the perimeter of the above figure,

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b) the area of the above figure.

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15. In a certain isosceles triangle, the lengths of each of the two longer sides is 5 cm more than the length of the shorter side. Let x cm denote the length of the shorter side.

a) Write down, in terms of x , the length of each of the longer sides.

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b) Write down, in terms of x , the perimeter of the triangle. Simplify your answer as far as possible.

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c) The perimeter of the triangle is 46 cm. Write down an equation in x . Solve this equation to find the value of x .

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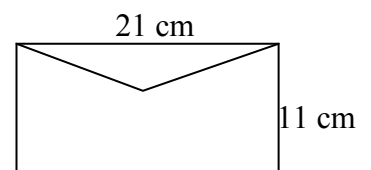
16. a) The length of an envelope is 21 cm to the nearest cm.

Write the smallest possible real length of the envelope.

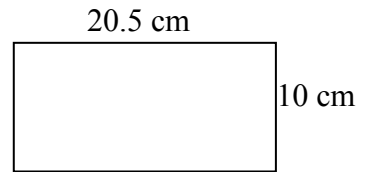
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Write the greatest possible real length of the envelope.

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b) The length of a card is 20.5 cm to the nearest **tenth** of a cm.



Write the smallest possible real length of the card.

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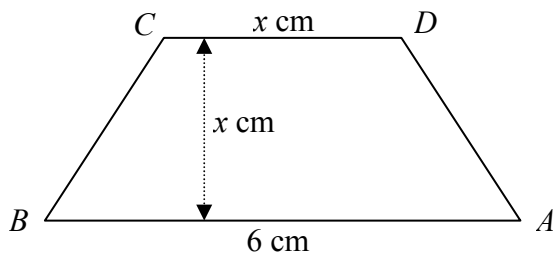
Write the greatest possible real length of the card.

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c) Can you be sure that the card will fit in the envelope? Explain your answer.

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17.



$ABCD$ is a trapezium with area 20 cm^2 .
 The length of $AB = 6 \text{ cm}$, $CD = x \text{ cm}$ and the perpendicular height is $x \text{ cm}$.

a) Show that x satisfies the equation $x^2 + 6x - 40 = 0$.

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b) Solve the equation $x^2 + 6x - 40 = 0$.

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c) Use your solutions in b) to write down the length of the side CD .

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18. a) Simplify $(5x^3 \cdot y^2) \times (10x^2 \cdot y)$.

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b) Factorise $9x^2 + 12x$.

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c) Remove the brackets and simplify $(3x + 1)(2x - 3)$.

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19. Work out: a) $5 + (-12)$
 b) $(-12) \div (-4)$

20. Solve the equation $\frac{x + 4}{2} + \frac{x - 2}{3} = 8$.

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21. A toy set consists of 4 geometric shapes; a cube, a square-based pyramid, a tetrahedron and a triangular prism.
 Complete the table to show the number of edges, the number of faces and the number of planes of symmetry of each of the 4 shapes.

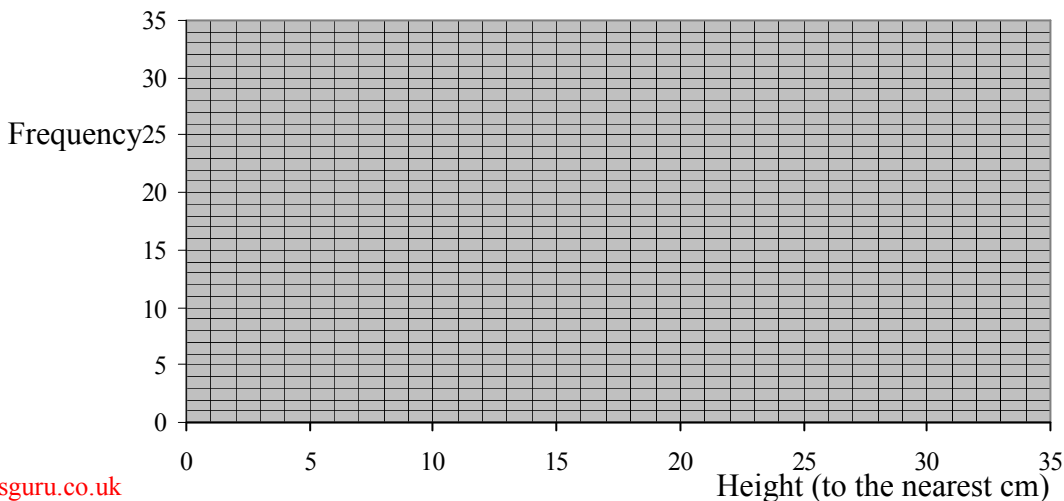
- a) Which shape has 9 edges?
- b) Which shape has 9 planes of symmetry?
- c) Which two of the shapes each have 5 faces?

22. A biologist measures the heights of 100 shrubs to the nearest cm. The following table shows her results.

Height (to nearest cm)	1 to 5	6 to 10	11 to 15	16 to 20	21 to 30
Frequency	12	16	22	30	20

- a) Calculate an estimate of the mean height of the shrubs in the sample.

- b) Draw a frequency polygon to show the biologist's results.



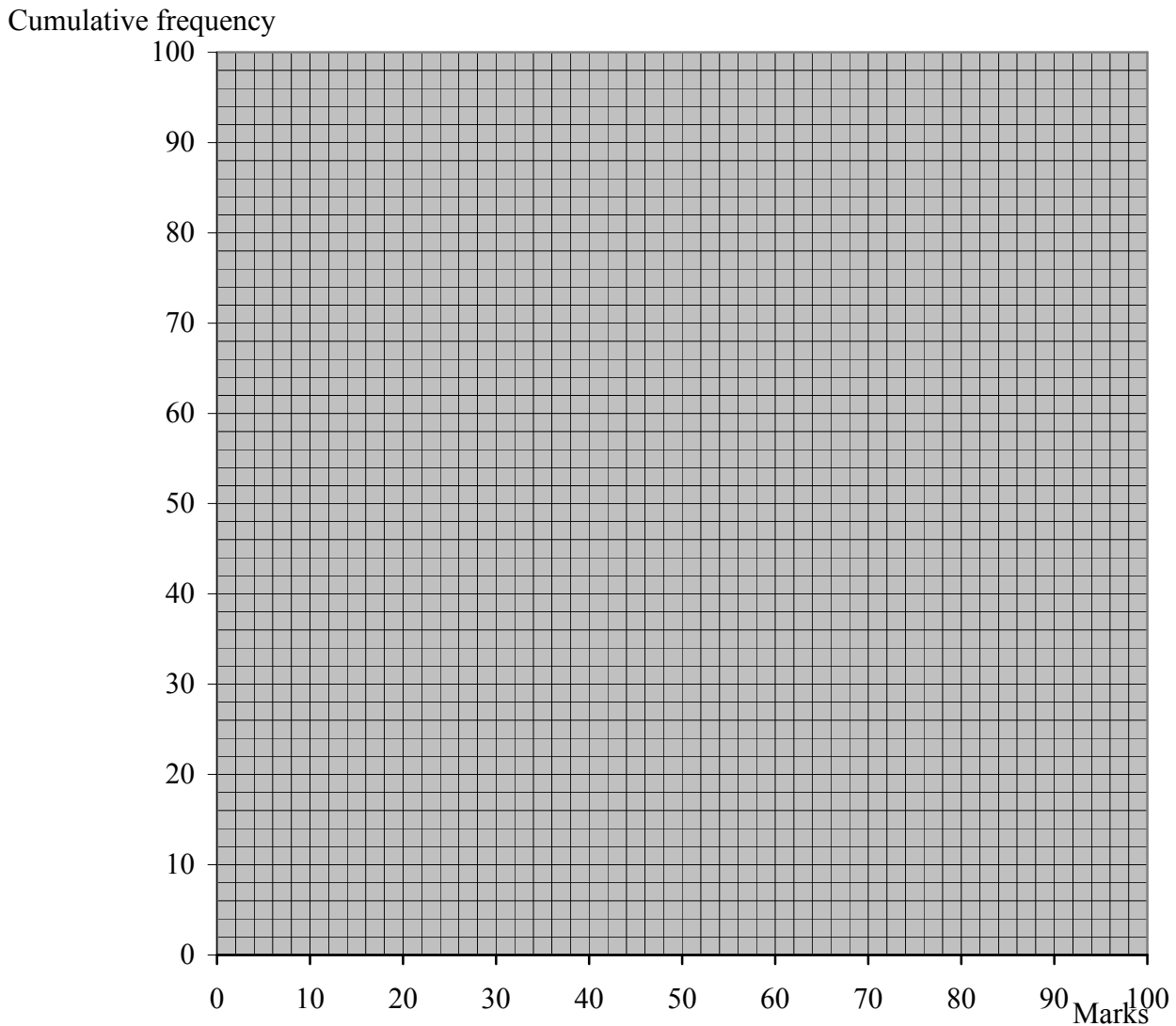
23. The following table shows the scores obtained by 100 students in a Science test.

Mark	20 to 39	40 to 59	60 to 69	70 to 79	80 to 89	90 to 99
Frequency	12	16	30	25	12	5

a) Complete the table below to show the cumulative frequencies for these results.

Mark	40	60	70	80	90	100
Cumulative Frequency						

b) Draw a cumulative frequency diagram to show these results.



c) Complete this table to show the median and inter-quartile range for this distribution.

Median	Lower Quartile	Upper Quartile	Inter-Quartile Range

d) 60 students passed the test. What was the pass mark?

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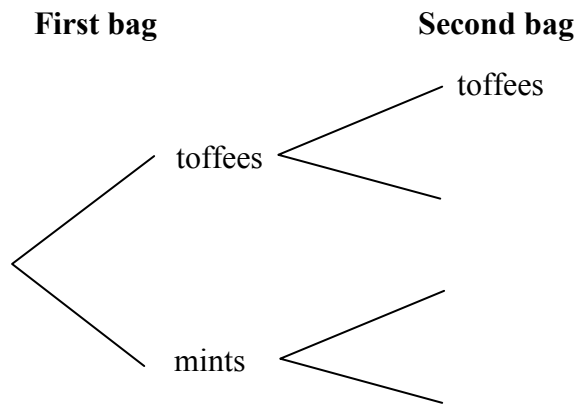
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24. a) A bag contains 4 toffees and 5 mints. Another bag contains 3 toffees and 5 mints. John takes one sweet from each bag without looking. Complete this tree diagram to show the possible outcomes and their probabilities.



- b) What is the probability that John takes

i) two mints,

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ii) exactly one mint?

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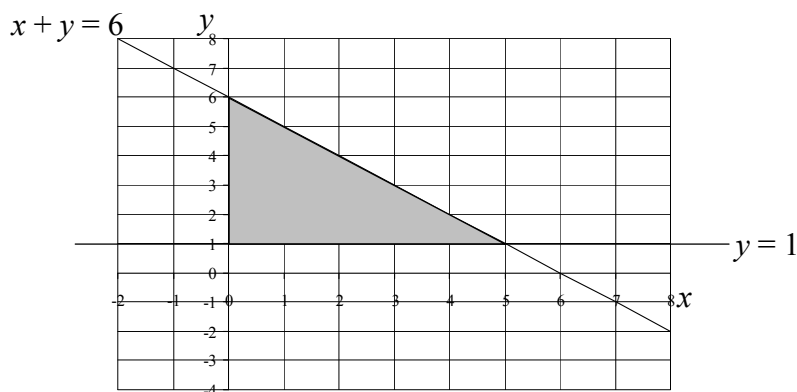
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Answers.

1. a) £192, b) 21 litres.
2. a) {80% of original price = £160. Use this to work out 100% etc.} Answer = £200, b) 20%.
3. a) Use $\frac{600 \times 40}{3 \times \sqrt{64}}$ etc. Answer = 1000, b) i) 30 cm, ii) 20 m.
4. a) b) output = $\frac{n + 3}{2} - 6$

INPUT	OUTPUT
11	1
15	3
-1	-5
21	6

5. a) $3x$, b) $2(x + 1)$ or $2x + 2$, c) $5x + 2$.
6. i) {First work out the size of each of the 5 interior angles etc.} Answer = 36° , ii) 306° .
7. $x = 95^\circ$, $y = 110^\circ$.
8. b) 18:00 or 6.00 p.m., c) 20 mph, d) 17:00 or 5.00 p.m.,
e) 15:48 or 4.48 p.m.
9. £992.
10. {Convert both fractions to 18^{ths} etc.} Answer = $\frac{5}{6}$.
11.



12. a) 8, b) $2 \times 3^2 \times 5$, c) $2^4 \times 3^2 \times 5^2$, d) $2^2 \times 3 \times 5$.
13. i) 3.6×10^2 , ii) 1.0252×10^3 , iii) 4.5×10^{-3} .
14. a) 50 cm, b) 103 cm^2 .
15. a) $x + 5$, b) $3x + 10$, c) $3x + 10 = 46$. $x = 12$.
16. a) Smallest = 20.5 cm, greatest = 21.5 cm, b) smallest = 20.45 cm, greatest = 20.55 cm,
c) The largest possible length of card (20.55 cm) will clearly not fit in the smallest possible envelope.
So the answer is no, the card will not necessarily fit in the envelope.
17. b) {Factorise into 2 brackets etc.} $x = -10$ or $x = 4$, c) $CD = 4$ cm.
18. a) $50x^5y^3$, b) $3x(3x + 4)$, c) $6x^2 - 7x - 3$.
19. a) -7, b) 3.
20. $x = 8$.
21. a) Triangular prism, b) cube, c) square-based pyramid and a triangular prism.
22. a) {Use mid-points etc.} 14.9 cm.

23. a)

Mark	40	60	70	80	90	100
Cumulative Frequency	12	28	58	83	95	100

c)

Median	Lower Quartile	Upper Quartile	Inter-Quartile Range
67	56	77	21

d) 64%.

24. b) i) $\frac{25}{72}$, ii) $\frac{35}{72}$.