








Create assessment materials quickly and easily! Choose from over 250 questions, covering **KS3 Number, Algebra, Data handling, and Shape, space and measure.**

How to ...

1. Open both the Question bank (20769) and Test template (20769_1). You may need to click 'enable content' and ensure macros are allowed
2. To copy a question from the Question bank, choose a topic using the tabs at the bottom of the window, then select a question by clicking the on the question number. The question will be surrounded by a dashed line to show it has been copied.
3. To paste the question into the Test template:
 - a. Select a cell in the left-hand margin (labelled 'paste questions here') where you want the question to be positioned
 - b. click '**paste contents**'  at the top of the window. Your question will appear in your template and be removed from the Question bank.
4. Continue to copy and paste questions to create your assessment. Be aware of the page breaks (blue dashed lines) – you can 'insert rows'  to move a question down onto the next page if needed.
5. You can recalculate the numbers in the question. Refresh selected values by highlighting the desired cell(s) and pressing '**recalculate selected cells**' . For questions with graphs and diagrams, select the whole question before recalculating. To recalculate the whole test at once, press F9.
6. Complete your test by updating the 'Core questions total' – select the cell at the beginning of that row, then click '**recalculate selected cells**' . Repeat for the 'Extension questions total' if applicable.
7. Save your work using 'Save as...' and choosing a new filename, to avoid overwriting the template. Don't save the question bank, to ensure all questions are available for next time.

Options

- **Show or hide answers** using the drop down menu at the top of each window. Answers will be shown in red. Sometimes you may need to click to a different tab then back again for them to display.
- **Add or remove extra rows** as required using the green and red arrows  .
- Remove a question from the Test template by highlighting all appropriate cells and pressing '**delete content**' . The process may take a few moments if there is a lot of content. *Please note, deleting a question using 'delete rows' is not recommended, especially with graphs.*
- You may need to manually copy graphs – select the graph, press Ctrl+X, then on the Test template press Ctrl+V.

The question bank is password protected to avoid accidental saving. Should you wish to adapt the file, the password is 'password'.

1 Calculate the following, showing all working out:

- a) $7642 + 365$ b) $7075 - 747$
c) 3900×7 d) $8412 \div 12$ [4]

2 Calculate the following, showing all working out:

- a) 1606×56 b) $29655 \div 45$ [4]

3 Find the answer to the following problems, showing all working out:

- a) The total of James and John's age is 104 years.
If James is 59 how old is John?
b) A crate holds 9 tins.
How many tins in 835 crates?
c) There are 549 pupils in Year 7 and 444 pupils in Year 8.
How many pupils are there in total in Year 7 and Year 8?
d) A group of 3 friends share 123 sweets equally between themselves.
How many sweets will each receive? [8]

4 Work out:

- a) 4273×1000 b) $11000 \div 1000$ [2]

5 Work out:

- a) 44.147×100 b) 84.54×100
c) $12.174 \div 1000$ d) $83.365 \div 10$ [4]

6 Work out:

- a) 72.77×0.1 b) 80.09×0.001
c) $85.943 \div 0.1$ d) $61.8 \div 0.01$ [4]

7 Calculate the following:

- a) $45.2 + 7.69$ b) $14.48 - 9.14$

- c) 11.8×11 d) $202.44 \div 12$ [4]

8 Calculate the following, showing all working out:

- a) 711×7000 b) $12100 \div 1100$ [4]

9 Calculate the following, showing all working out:

- a) 19.95×0.8 b) $0.22 \div 0.02$ [4]

10 Use the information below to work out the following questions:

$$0.643 \times 0.453 = 0.291279$$

- a) 643×0.453 b) 0.643×45.3 [2]

11 Answer the following:

- a) Multiplying by 0.02 is the same as dividing by what number?
b) Dividing by 0.5 is the same as multiplying by what number? [2]

12 Answer the following questions about the decimal number 352.25

- a) How many hundredths does the number have?
b) How many tens does the number have? [2]

13 Put these numbers in order, starting with the smallest:

3, 12, 9, 5, 6 [2]

14 Put these numbers in order, starting with the smallest:

1.7, 4.3, 5.7, 1.3, 4 [2]

15 Put these numbers in order, starting with the smallest:

10, -5, 6, -10, -12 [2]

16 Put these numbers in order, starting with the smallest:

2.7, -9.4, -4.3, -8, -9

[2]

17 Put these fractions in order, starting with the smallest:

$\frac{1}{5}$ $\frac{1}{9}$ $\frac{1}{4}$ $\frac{1}{10}$ $\frac{1}{6}$

[2]

18 Put the following in order of size.

Start with the smallest number first.

0.2 $\frac{2}{5}$ 0.57 100%

[2]

19 Complete the following statements by inserting one of the symbols =, > or <.

a) $\frac{2}{3}$ 0.81

b) 13% 0.3

[2]

20 Complete the following statements by inserting one of the symbols =, > or <.

a) 6 5

b) -3 -6

[2]

21 Work out:

a) $(3 + 6) \times (5 + 7)$

b) $2 + 4 \times 9 - 4$

[2]

22 The temperature in a town at midnight is -5°C .

The temperature rises to 3°C at midday.

What has been the overall change in temperature?

[2]

23 Calculate:

a) $-2 + 8$

b) $12 - 8$

c) $10 + 4 - -5$

d) $-6 + -4 - -4$

[4]

24 Calculate:

a) $-10 + 8 - 6$

b) $9 + 5 - -12$

[2]

25 Calculate:

a) 2×-7

b) $44 \div -11$

[2]

26 Convert the following between mixed and improper (top heavy) fractions:

a) $3 \frac{4}{11} =$

b) $\frac{50}{4} =$

[2]

27 Calculate the following, showing all working out:

a) $\frac{1}{2} + \frac{1}{2}$

b) $\frac{2}{3} - \frac{1}{3}$

[2]

28 Calculate the following, showing all working out:

a) $\frac{1}{8} + \frac{1}{5}$

b) $\frac{4}{9} - \frac{1}{6}$

c) $4 \frac{1}{2} \times \frac{4}{11}$

d) $\frac{9}{11} \div 2 \frac{4}{7}$

[8]

29 Calculate the following, showing all working out:

a) $\frac{5}{6} + \frac{1}{2} \times \frac{1}{2}$

b) $4 \frac{5}{8} \div \frac{2}{3} + \frac{1}{2}$

[4]

30 Round these numbers to the degree of accuracy given in the brackets:

a) 7864 (nearest 10)

b) 4124 (nearest 100)

[2]

31 Round these numbers to the degree of accuracy written in the brackets:

a) 23.44 (2 d.p.)

b) 8323 (1 s.f.)

c) 61.2317 (3 d.p.)

d) 0.16 (1 s.f.)

[4]

32 A school buys tickets for a theatre trip.

Number of students:	68
Cost per student:	£9.02

By rounding to 1 significant figure, estimate the total cost of the trip.
Will the estimate be over or under that actual amount? Explain. [3]

33 a) Write down which of the options below is the best estimate for 26×37 .

- A 1200 B 12000 C 120 D 12

b) Work out the exact answer of 26×37 . [2]

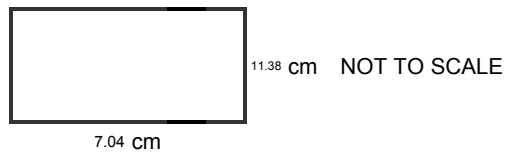
34 By rounding each number in the calculation to one significant figure, estimate:

a) $\frac{49.99 \times 13.69}{44.8}$ b) $\frac{91.52 \times 27.3}{37.43}$ [4]

35 The length of a room is measured as 9.6 metres, rounded to 1 d.p.
Complete the inequality to show the range of possible lengths.

\leq length $<$ [2]

36 The lengths on the rectangle have been rounded to 2 d.p.

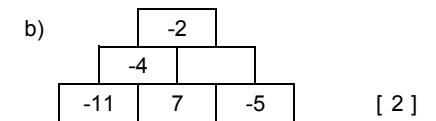
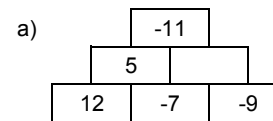


Copy and complete the inequality below to show the range of possible areas.

\leq area $<$ [2]

37 The attendance in a stadium is estimated as 7900, to the nearest 100.
What is the minimum possible number of people attending? [2]

38 To find the next number brick in an addition pyramid we add the two bricks below it.
Work out the missing numbers.



39 Complete the table:

Fraction	Percentage	Decimal
$\frac{1}{5}$		
	5%	
		0.3

[6]

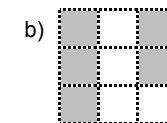
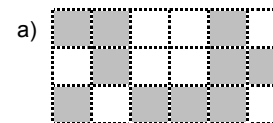
40 Complete the table to match up the equivalent fractions, decimals and percentages.

[4]

41 Write each recurring decimal as a fraction in its lowest terms:

- a) 0.22222222 b) 0.65656565 [2]

42 Write what fraction of the shapes below are shaded:



[2]

43 Complete the following:

a) $\frac{3}{5} = \frac{6}{\text{input}}$ b) $\frac{\text{input}}{4} = \frac{18}{36}$ [2]

44 Simplify the following fractions into their lowest terms:

a) $\frac{40}{\text{input}}$ b) $\frac{18}{\text{input}}$

$60 - \square$

$24 - \square$ [2]

45 Work out the following:

a) $\frac{1}{6}$ of 60 b) $\frac{1}{4}$ of 44 [2]

46 Work out the following:

a) $\frac{2}{5}$ of 50 b) $\frac{2}{5}$ of 96 [2]

47 Put the following in order of size, starting with the smallest.

$\frac{3}{7}$ of 70	0.1×140	50% of 44
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[2]

48 Work out the following:

a) $\frac{2}{5}$ of \square = 33 b) $\frac{2}{5}$ of \square = 22 [4]

49 A shop buys an item for £29 and sells it to the customer for £80.
Calculate the percentage profit. [2]

50 Work out the following:

a) 5% of 110 b) 65% of 240 [2]

51 Work out the following:

a) 24% of 310 b) 5% of 310 [2]

52 Write an answer for the following:

a) Increase 42 by $\frac{1}{5}$ b) Decrease 72 by $\frac{1}{5}$ [4]

53 Write an answer for the following:

a) Increase 88 by $\frac{2}{5}$ b) Decrease 50 by $\frac{4}{5}$ [4]

54 Write an answer for the following.

a) Increase 100 by 45% b) Decrease 20 by 21% [4]

55 Write an answer for the following.

a) Increase 70 by 70% b) Decrease 40 by 30% [4]

56 Work out the following:

a) 30% of \square = 315 b) 80% of \square = 384 [2]

57 A computer is on sale in two different shops.

Megabyte Stores		PC Magic
£120 less discount of $\frac{1}{5}$		£360 plus tax of 15%

Showing all working out, explain which shop is selling the cheaper computer. [4]

58 Answer the following problems:

- a) After a reduction of 30%, an item in a sale now costs £42.00. Find the original price of the item.
- b) After a 40% tip has been added, a bill in a bar costs £123.20. Find the amount of the bill before the tip is added. [4]

59 Amy wants to buy a television and sees the offer below.

Payment by Cash Sale price less 20% discount	Sale Price £640.00	Payment by credit A deposit of 30% of the sale price plus 12 installments of £46
---	-------------------------------------	--

- a) How much is the deposit for the television when paying by credit?
- b) What is the total cost of the television when paying by cash?
- c) How much more does it cost Amy when paying by credit? [4]

60 Assume the exchange rate to be £1 = €1.04.

Copy and complete the following.

a) £38 = b) = €85.28 [4]

61 A class contains 7 girls and 2 boys. Give all answers in their simplest form.

- a) What is the ratio of girls to boys?
 - b) What is the ratio of boys to the total number of pupils in the class?
 - c) What fraction of the class are girls?
 - d) What fraction of the class are boys?
- [4]

62 Below is a recipe for a fruit cocktail drink.



- a) What is the ratio of orange to cranberry?
 - b) What fraction of the drink is cranberry?
 - c) How much sugar syrup would be needed if 900ml of orange juice is available?
 - d) What's the ratio of sugar to orange?
- [4]

63 Simplify the following ratios:

- a) 6 : 18
 - b) 56 : 35
 - c) 8 cm : 4 m
 - d) 12 min : 6 hrs
- [4]

64 Give the following ratios in the form 1 : n.

- a) 11 : 9
 - b) 3 : 8
- [2]

65 The length of one side of square A is 2cm.

The length of one side of square B is 8 times the length of square A.

Write the ratio of the areas of square A : square B in the form 1 : n. [2]

66 Two people, Jo and Bill, share an amount of money in the ratio of 5 : 6.

How much Jo will receive if they share £110? [2]

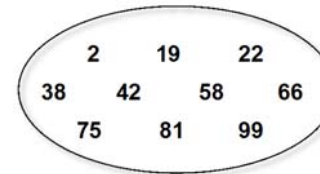
67 The cost of 9 pens is £11.70.

How much will 7 pens cost? [2]

68 It takes 5 teachers 30 days to mark a set of exam papers.

How long would it take 2 teachers? [2]

69 Look at the set of numbers below.



Write down which of the numbers above satisfy the following categories:

- a) Even numbers.
 - b) Multiples of 7.
 - c) Less than 30.
 - d) Multiples of 11.
- [4]

70 The 1st square number is 1.

Write down the 3rd square number. [1]

71 The 1st triangular is 1.

Write down the 6th triangular number. [1]

72 Give each of the following as a product of prime numbers:

- a) 245
 - b) 147
- [2]

73 List all the factors of the following numbers:

- a) 92
 - b) 44
- [2]

74 Find an answer to the following:

- a) What is the lowest common multiple (LCM) of 6 and 8?
 - b) What is the highest common factor (HCF) of 43 and 59?
- [4]

75 Give the first 3 multiples of the numbers below.

- a) 6
 - a) 5
- [2]

76 The 1st prime number is 2.
Write down the 2nd prime number. [1]

77 Write down the value of the following:

a) 7^3 b) 4^5 [2]

78 Write the following in index form:

a) 4×4
b) 2×2 [2]

79 Write down the exact value of the following:

a) $\sqrt{144}$ b) $\sqrt[3]{216}$ [2]

80 Use a calculator to give the value of the following to 2 d.p.

a) $\sqrt{3}$ b) $\sqrt[3]{23}$ [2]

81 A maths student wants to work out the answer to the calculation below.

$$\frac{4^2 - 11}{2}$$

Explain why the following, entered into a calculator, may not give a correct answer.

4 x² - 11 ÷ 2 =

What is the correct answer rounded to 1 decimal place? [2]

82 Using a calculator work out the following to 3 d.p.

a) $\frac{3.3^3}{16.81}$ b) $\frac{90.64 + 77.7}{10.1}$ [4]

83 Using a calculator work out the following to 3 d.p.

a) $\frac{36.1 \times 67}{16.812 + 65.3}$ b) $\frac{17.9 + 43.1}{6.9 + 3 \times 2}$ [4]

84 Simplify the following, giving your answers in index form:

a) $3^9 \times 3^7 = \boxed{}$ b) $\frac{5^2}{5^{11}} = \boxed{}$

c) $\frac{6^3 \times 6^9}{6^9} = \boxed{}$ d) $\frac{10^9 \times 10^9}{10^9} = \boxed{}$ [4]

85 Write down the value of the following:

a) 2^{-3} b) 5^{-6} [2]

86 Give the following numbers in standard form:

a) 2700 b) 0.0000075 [2]

87 Calculate the following:

a) 10×10^4 b) $61 \div 10^3$ [2]

88 The following numbers are in standard form. Give them as normal numbers.

a) 9.39×10^{-4} b) 6.47×10^{-2} [2]

89 Complete the following for the numbers in standard form.

a) $3.82 \times 10^3 = \boxed{}$ b) $\boxed{} \times 10^{\boxed{}} = 0.00686$ [2]

90 Work out the following and write your answers in standard form.

a) $(5.8 \times 10^1) \times (3.5 \times 10^{-4})$
a) $(4.6 \times 10^2) \div (6.8 \times 10^2)$ [2]

91 A star is 3.9×10^{22} km away from the earth.

The speed of light is 300,000 km/s.

How many years will take the light from the star to reach the earth? [2]

1 Write down the next two terms in each number sequence:

- a) 12, 5, -2, -9, -16 b) 7, 13, 19, 25, 31 [2]

2 Write down the next term in each number sequence:

- a) 2, -6, 18, -54, 162 b) 5, -20, 80, -320, 1280 [2]

3 Look at this sequence of drawings made up of black and grey squares:



a) Complete the table below.

black squares	grey squares	total number of squares
1	6	7
2	10	12
3		
4		

- b) How many grey squares will there be if there are 11 black squares?
c) How many black squares will there be if there are 28 grey squares? [8]

4 Work out the missing numbers in these sequences:

- a) 5.7, ?, 8.5, 9.9, 11.3 b) 2, ?, 10.6, 14.9, 19.2 [2]

5 Work out the missing numbers in these sequences:

- a) 2.6, ?, 14.4, 20.3, 26.2 b) -4.8, ?, -2.6, -1.5, -0.39! [2]

6 A number sequence is generated by adding 8 to the previous term.
If the first term of the sequence is 7, write down the next two terms.



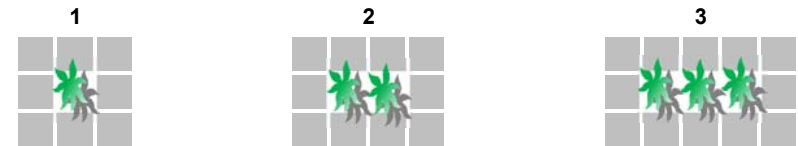
[2]

7 A number sequence is generated by multiplying the previous term by 7.
If the first term in the sequence is 3, write down the next two terms.



[2]

8 This sequence of pictures shows paving slabs surrounding a flower bed:

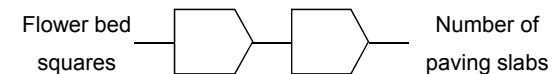


a) Draw the next pattern in the sequence.

b) Complete the table below.

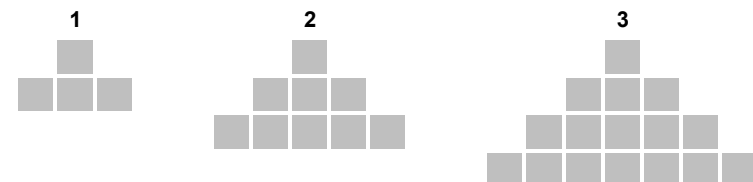
Flower bed squares	Number of paving slabs
1	
2	
3	
4	

c) Complete the sequence rule below.



[6]

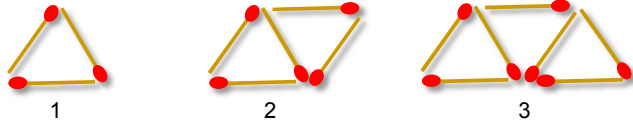
9 The sequence below shows a series of tile patterns.



- a) Draw the next pattern in the sequence.
 b) How many tiles will there be in pattern 12?
 c) Which pattern has 4 tiles?

[6]

10 Look at the matchstick sequence below.



- a) Draw the next pattern in the sequence.
 b) How many sticks are in pattern 12?
 c) Which pattern has 17 sticks?

[6]

11 Find the 13th term for each number sequence:

a) 1st 2nd 3rd 4th 5th
 2 8 14 20 26

b) 1st 2nd 3rd 4th 5th
 10 4 -2 -8 -14

[2]

12 Find the n^{th} term for each number sequence:

a) 1st 2nd 3rd 4th 5th
 5 14 23 32 41

b) 1st 2nd 3rd 4th 5th
 5 2 -1 -4 -7

[4]

13 Find the general rule, or n^{th} term, for the number sequences below:

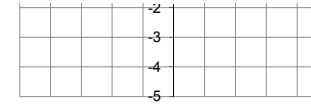
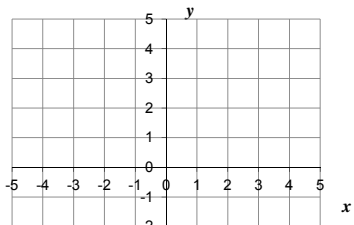
a) 1st 2nd 3rd 4th 5th
 9 19 33 51 73

b) 1st 2nd 3rd 4th 5th
 11 20 33 50 71

[4]

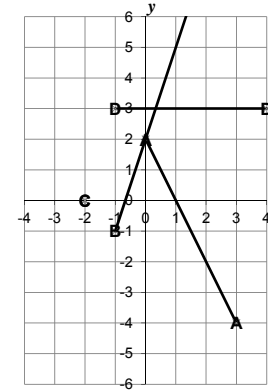
14 Plot these four points on a pair of axes:

A(0, -3), B(-4, -2), C(-2, -1) and D(5, -5).



[4]

15 Look at the straight lines on the graph below and match each one to the equation.



$y = 3x + 2$



$y = -2x + 2$



$y = 3$

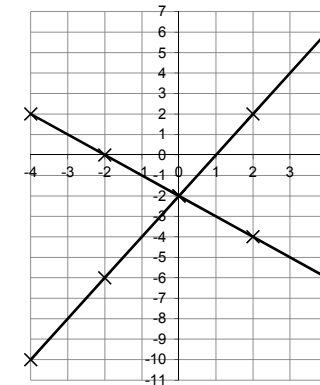


$x = -2$



[4]

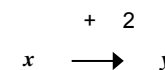
16 The straight lines on the graph below have equations $y = 2x - 2$ and $y = -x - 2$.



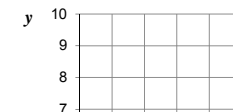
- a) Where does the line $y = 2x - 2$ cross the x-axis?
 b) Where does the line $y = -x - 2$ cross the y-axis?
 c) Write down the point of intersection, if any, between the two lines.

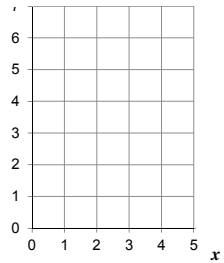
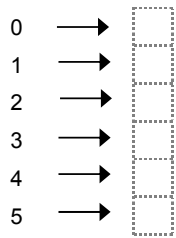
[3]

17 a) Copy and complete the function machine below.



b) Use your answers from a) to plot the graph of $y = x + 2$





[4]

18 a) Complete the table below for the graph of $y = 2x + 1$.

x	-3	-2	-1	0	1	2	3
y	-5		-1				7

b) Draw a pair of axes and use the table above to plot the graph.

c) What is the gradient of the line?

d) What is the y-intercept?

[6]

19 Complete the table below:

equation of line	gradient	y-intercept
$y = 4x - 6$		
$y = 9 + x$		
	-3	-2

[6]

20 Complete the table below for the graph of $y = 2x^2 + 5x - 3$.

x	-4	-3	-2	-1	0	1	2	3	4
y	9	?	-5	-6	?	?	?	30	49

Draw a pair of axes with x from -4 to 4 and y from -6 to 49.

Use the table above to complete the graph.

[6]

21 Complete the table below for the graph of $y = 10/x$

x	0.5	1	1.5	2	2.5	3	3.5	4
y	20		6.7					2.5

Draw a pair of axes with x from 0 to 4 and y from 0 to 20.

Use your table above to complete the graph.

[6]

22 State whether each of the following is an expression, formula or equation:

a) $2x + 6 = 8$

b) $A = L \times W$

[2]

23 Write an algebraic expression for each of the questions below:

a) John's age is x years. His sister is 11 years younger.

How old is John's sister?

b) Beth scored n marks on a test. Her friend's score was 7 times better.

What was her friend's score?

[2]

24 Look at the following algebraic expressions:

$n + 5$

$8n$

$\frac{n}{5}$

$4n^2$

a) When $n = 10$ which expression gives the largest value?

b) When $n = 10$ which expression gives the smallest value?

[4]

25 Look at the following algebraic expressions:

$n + 5$

$12n$

$\frac{n}{7}$

$-11n^2$

a) When $n = 3$ which expression gives the largest value?

b) When $n = 11$ which expression gives the smallest value?

[4]

26 Simplify the following expressions:

a) $8z - 8y - 9z + y$

b) $z + -y + 3z - 2y$

[2]

27 Simplify the following expressions:

a) $-9e + 6e - 7e - 5e$

b) $7y + 8y + 7y + 8y$

[2]

28 Expand and simplify each of the following expressions:

a) $(a + 3)(a - 5)$

b) $(b - 6)(b + 2)$

[4]

29 Expand and simplify:

$-5(-5d - 6) - 3(5d + 5)$

[2]

30 Expand and simplify:

$6f - 2(11f + 4)$

[2]

31 Multiply out:

a) $3(4y + 5)$

b) $11(5c + 3)$

[2]

32 Multiply out:

a) $11g(3g - 6)$

b) $4h(-3h + 2)$

[2]

33 Factorise:

a) $-96s + 36$

b) $9t - 18$

[2]

34 Factorise:

a) $48s^2 - 72s$

b) $24t^2 - 54t$

[2]

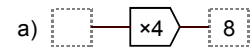
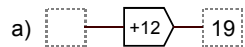
35 Factorise:

a) $y^2 - 13y + 42$

b) $z^2 + 5z - 24$

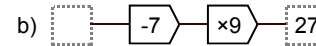
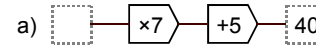
[4]

36 Complete these function machines:



[2]

37 Complete these function machines:



[2]

38 Use the following statements to form an equation, then find the value of x .

- I think of a number x .
- I multiply my number by -5 then take away 3.
- The answer I get is -48 .

[2]

39 Use the following statements to form an equation, then find the value of x .

- I think of a number x .
- I multiply my number by -5 then add 3.
- The answer is 39 more than the number I started with.

[2]

40 Solve the following equations:

a) $a - 4 = -6$

b) $b - 4 = 8$

c) $3c = 18$

d) $d \div -3 = 8$

[4]

41 Solve the following equations:

a) $a + 7 = 13$

b) $b - 2 = 2$

c) $2c = 12$

d) $d \div 3 = 8$

[4]

42 Solve the following:

a) $-4y + 8 = 40$

b) $y/3 - 7 = 2$

[4]

43 Solve the following:

a) $7y + 8 = 64$

b) $y/4 + 5 = 10$

[4]

44 Solve the following:

a) $7(z + 3) = 42$ b) $-7(z + 6) = -63$ [4]

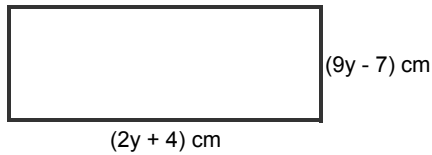
45 Solve the following:

a) $g - 2 = 5g + 6$ b) $-8h + 2 = 2h + 52$ [4]

46 Solve the following:

a) $7j + 5 = j + 53$ b) $6k + 9 = 6k + 9$ [4]

47 The sides of this rectangle are given as algebraic expressions:



- a) Write an expression, in terms of y , for the perimeter of the rectangle.
 b) If the perimeter of the rectangle is 60cm find the value of y . [4]

48 Solve the following pairs of simultaneous equations:

a) $5a + b = -11$ b) $5c - 5d = -10$
 $6a - 4b = -34$ $-3c - 5d = 14$ [4]

49 Solve the following pairs of simultaneous equations:

a) $-2e + 5f = 10$ b) $-5g + 2h = 12$
 $-2e + 6f = 14$ $-2g + 2h = 0$ [4]

50 If $a = -1$, $b = -4$ and $c = 5$ find the value of the following:

- a) $a + b - c$ b) $2a - 2c$
 c) c / a d) $-4b^2$ [4]

51 If $a = 2$, $b = 1$ and $c = 4$ find the value of the following:

- a) $a + b - c$ b) $4a + 2c$
 c) c / a d) $5b^2$ [4]

52 The formula to find the volume of a square based pyramid is given by $V = \frac{1}{3}x^2 h$

Find the value of V when:

- a) $x = 6\text{cm}$, $h = 4\text{cm}$ b) $x = 6\text{cm}$, $h = 4\text{cm}$ [4]

53 Simplify the following expressions:

a) $\frac{(2y^3)^2}{y^{-3}}$ b) $\frac{(-2y^{-4})^4}{y^2}$ [4]

54 The formula to find the area of a trapezium is given by $A = \frac{1}{2}h(a + b)$

- a) Find the value of A if $a = 3\text{cm}$, $b = 5\text{cm}$ and $h = 10\text{cm}$.
 b) Find the value of a if $A = 12\text{cm}^2$, $b = 3\text{cm}$ and $h = 6\text{cm}$. [4]

55 Make x the subject of the following formulae:

- a) $c = 1x$ b) $x - 5 = y$
 c) $v = -6x + 4$ d) $A + 1 = -3x - 5$ [6]

56 Use trial and improvement to find x to 2 d.p. when $x^2 + 2x = 65$.

x value	working out	result
7	$7^2 + 2(7) = 63$	too low
⋮	⋮	⋮

57 Use trial and improvement to find x to 1 d.p. when $x^3 = 27$.

Show all your workings. [4]

58 Write down **two** possible values of x that satisfy each inequality.

- a) $x \leq -8$ b) $-12 < x < 6$ [2]

59 Solve the following inequalities:

a) $x + 6 > 8$

b) $x - 3 < 2$

c) $-3x + 3 < 18$

d) $x/-7 + 8 > 11$ [6]

60 Solve the following inequalities:

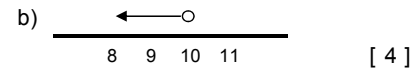
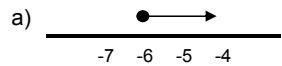
a) $x + 9 > 12$

b) $x - 8 < 3$

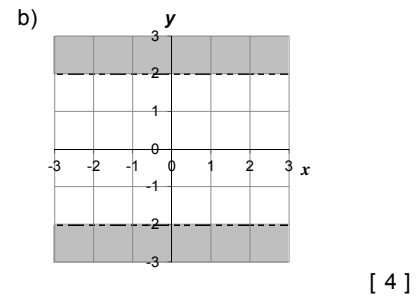
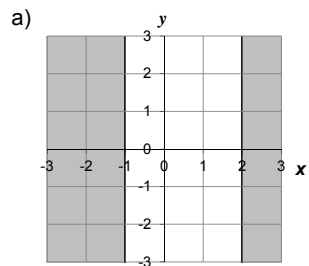
c) $8x + 3 < 27$

d) $x/9 + 5 > 8$ [6]

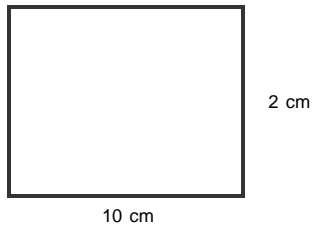
61 Write an algebraic inequality for each number line below.



62 Write down the **two** inequalities that define the shaded area of the graphs below.



1 For the rectangle below, calculate:

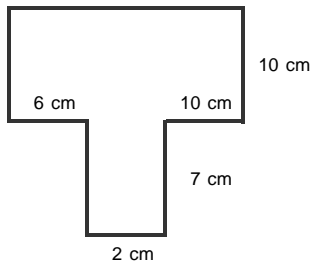


NOT TO
SCALE

- a) the perimeter
- b) the area.

[2]

2 For the shape below, calculate:

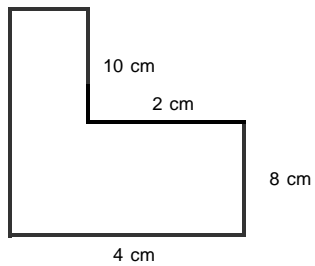


NOT TO
SCALE

- a) the perimeter
- b) the area.

[4]

3 For the shape below, calculate:

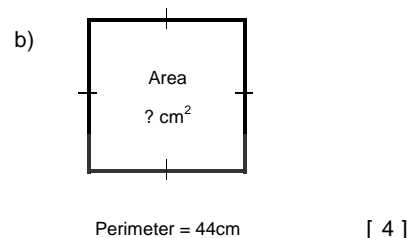
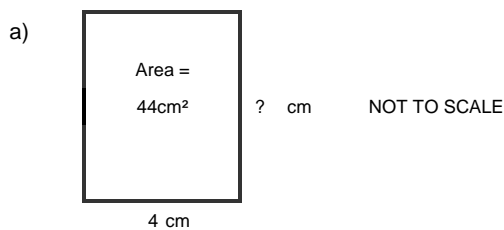


NOT TO
SCALE

- a) the perimeter
- b) the area.

[4]

4 For the shapes below, find the missing values.



5 The perimeter of a rectangle is 40cm.
The rectangle has a width of 8cm.
Work out the length of the rectangle.

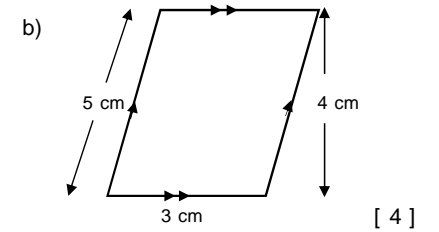
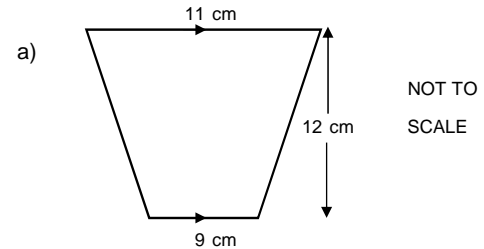
[2]

6 Using 1cm square paper, a pencil and a ruler draw accurately the following shapes:

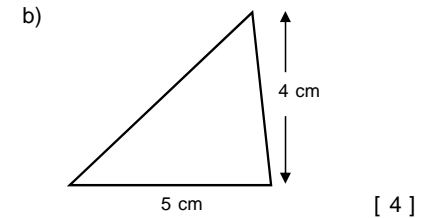
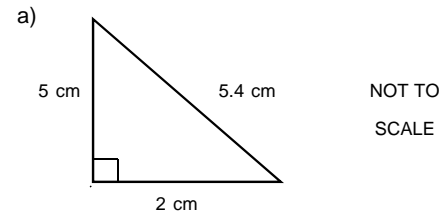
- a) a rectangle with an area of 22cm²
- b) a rectangle with a perimeter of 10cm.

[2]

7 Work out the area of these shapes:



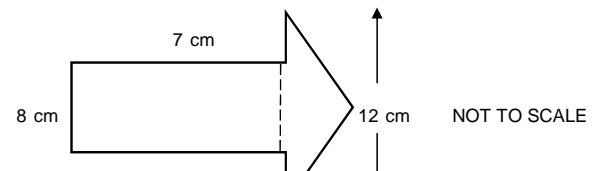
8 Work out the area of these triangles:

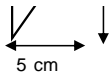


9 The area of a triangle is 45cm².
The height of the triangle is 9cm.
Work out the length of the base of the triangle.

[2]

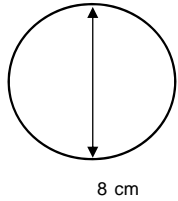
10 Work out the area of the shape below.





[4]

11 The circle below has a diameter of 8cm.

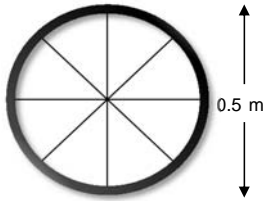


NOT TO
SCALE

Find:
a) the circumference
b) the area.

[4]

12 The diagram below shows a bicycle wheel with a diameter of 0.5m.

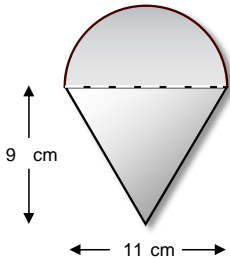


NOT TO
SCALE

- What is the circumference of the bicycle wheel?
- How many revolutions of the wheel would be needed to cover 1km?

[4]

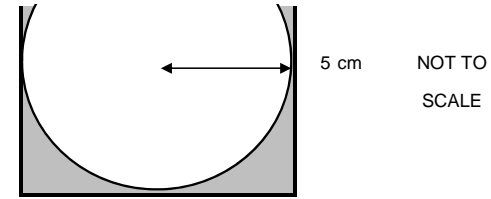
13 The diagram shows a badge made from an isosceles triangle and a semi-circle. Work out the area of the badge.



NOT TO
SCALE

[4]

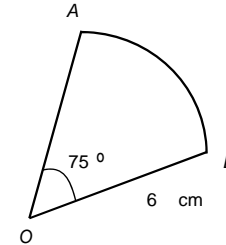
14 The diagram shows a circle of radius 5cm enclosed within a square. Calculate the area of the shaded section.



NOT TO
SCALE

[4]

15 The diagram below shows a sector of a circle AOB with radius 6cm.

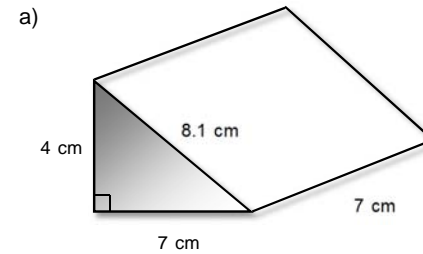


NOT TO
SCALE

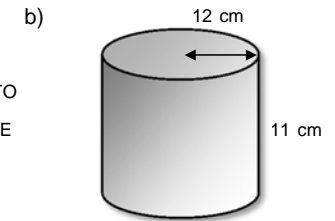
Find:
a) the arc length AB
b) the area of sector AOB.

[4]

16 Work out the volume of the following shapes:

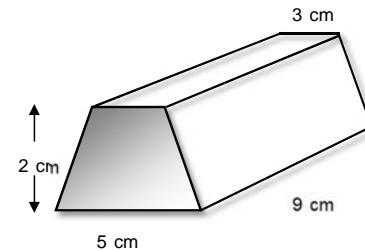


NOT TO
SCALE



[4]

17 Work out the volume of this gold bar:



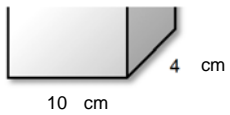
NOT TO
SCALE

[4]

18 Work out the volume of the cuboid below.

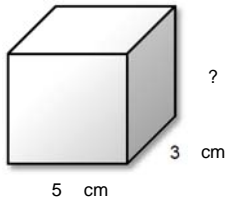


NOT TO
SCALE



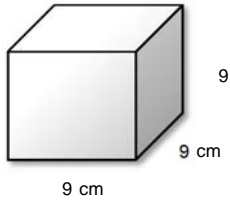
SCALE

- 19 The total volume of the cuboid below is 45 cm^3 .
Work out the length of the missing side.



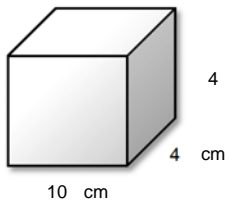
NOT TO
SCALE

- 20 Work out the surface area of the cube below.



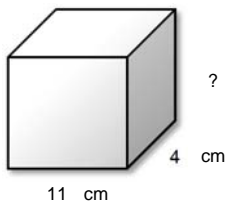
NOT TO
SCALE

- 21 Work out the surface area of the cuboid below.



NOT TO
SCALE

- 22 The total surface area of the cuboid below is 268 cm^2 .
Work out the length of the missing side.



NOT TO
SCALE

[2]

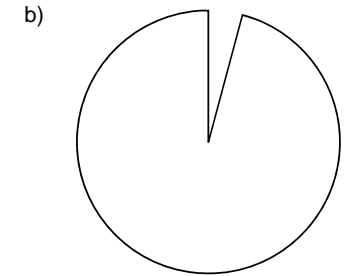
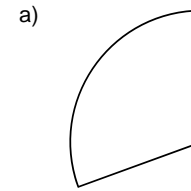
[2]

[2]

[2]

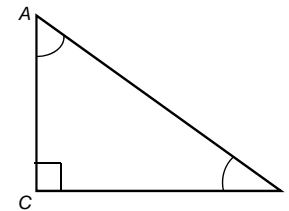
[2]

- 23 Use a protractor to measure these angles:



[2]

- 24 For triangle ABC, measure the following, giving answers to the nearest whole number:

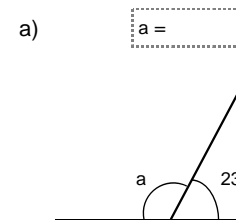


Measure

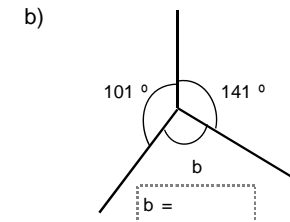
- a) angle ABC
b) side AC

[2]

- 25 Calculate the missing angles.

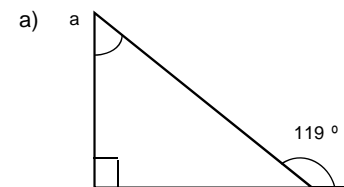


NOT TO
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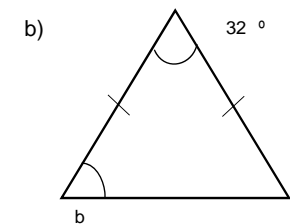


[2]

- 26 Calculate the missing angles.

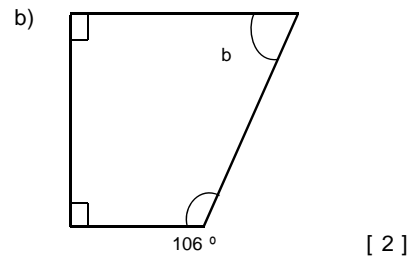
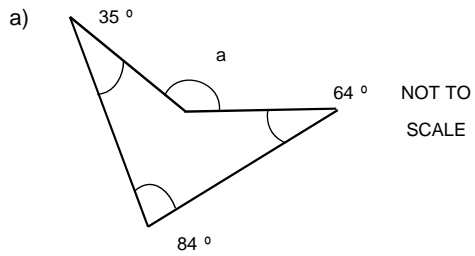


NOT TO
SCALE

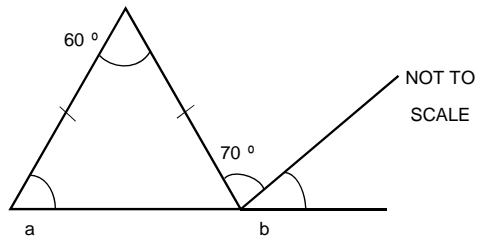


[2]

- 27 Calculate the missing angles.

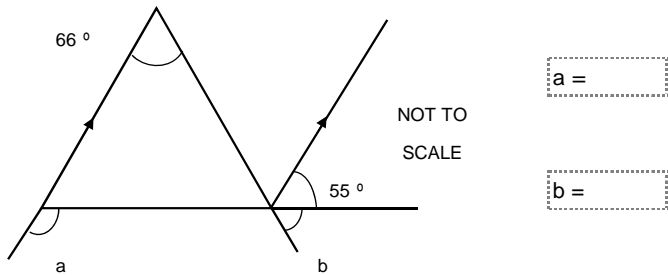


28 Calculate the missing angles.



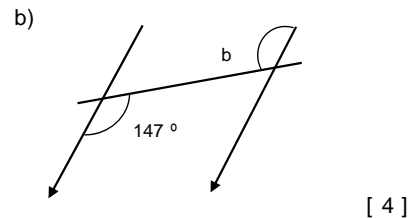
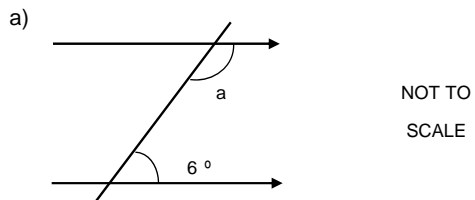
[4]

29 Calculate the missing angles below.

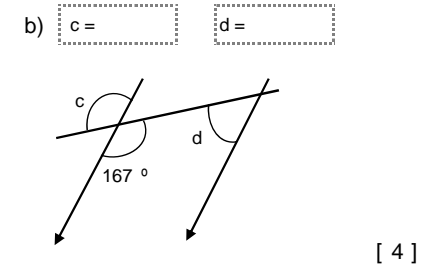
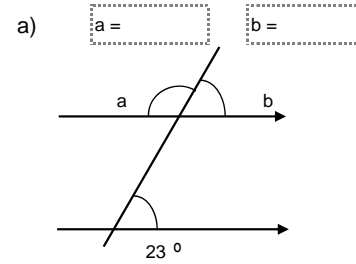


[4]

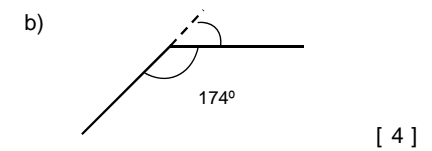
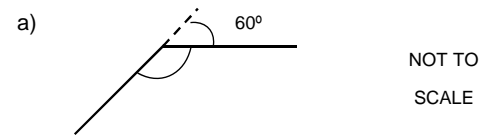
30 Calculate the missing angles, giving a reason for your answers.



31 Calculate the missing angles below.



32 The diagrams below show part of a regular polygon. Work out how many sides each polygon has.



33 Complete the following sentences.

- a) A triangle where all sides are equal is called
 - b) A is a quadrilateral with one line of symmetry and no parallel sides.
 - c) An irregular quadrilateral with all its angles the same is called a
 - d) A triangle where only two sides are equal is called
- [4]

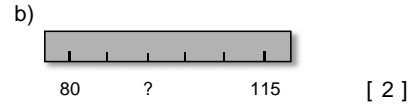
34 Complete the following sentences.

- a) A regular polygon has 6 sides. Each exterior angle is degrees.
 - b) A regular polygon has 3 sides. Each interior angle is degrees.
- [4]

35 Complete the following sentences.

- a) A cube has vertices.
 - b) A cuboid has edges.
 - c) A triangular prism has faces.
 - d) A square based pyramid has vertices.
- [4]

36 For each scale below, give the value represented by the question mark.



37 Put these numbers in order, starting with the smallest:

1000cm, 5km, 1000mm, 90m [2]

38 Choose an appropriate unit of measure below to measure each item.



- a) mass of a person b) length of a pen
c) water in a bath d) height of a classroom. [4]

39 Choose an appropriate unit of measure below to measure each item.



- a) Room temperature b) Length of a pen
c) Water in a bath d) The mass of a car [4]

40 Complete the following unit conversions:

- a) 9 ft = in b) 10 stone = lbs
c) 32 pts = gal d) 50 miles = km [4]

41 Complete the following unit conversions:

- a) 3 cm = mm b) 425 g = kg
c) l = 5000 ml d) cm = 7.97 m [4]

42 Show all workings to solve the problems below:

- a) A length of wood measuring 4m has a length of 15cm cut off.
What length remains?
b) A container holds 90 litres of water.
How many cups of 170ml can be filled from the container? [4]

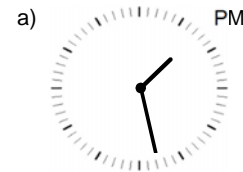
43 A map has a scale of 1:60. Two points are shown 10.3cm apart.
How far apart, in km, are the two points in real life? [2]

44 A film starts at 22:20 and lasts for 2 hours 5 minutes.
What time will the film will end? [2]

45 Complete the following conversions:

- a) Write 14:10 using the 12 hour clock.
b) Write 10:10 am using the 24 hour clock. [2]

46 Give the times shown on these analogue clocks in digital form:

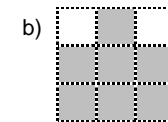
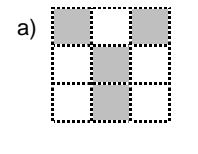


[2]

47 Complete the following conversions:

- a) 4 m² = cm² b) 5 cm³ = mm³ [2]

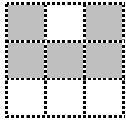
48 Complete the transformations described below:



Reflect the shape in the dotted line of symmetry.

Rotate the shape three quarters of a turn clockwise. [4]

49 Look at the shape below.

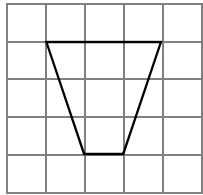


- a) How many lines of mirror symmetry does the shape have?
 b) What is the order of rotational symmetry of the shape?

[2]

50 Copy the shape below onto 1cm square paper.

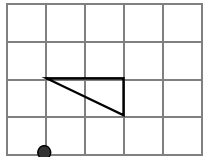
Translate the shape 5 squares to the left and 5 squares up.



[2]

51 Copy the shape below onto 1cm square paper.

Enlarge the shape by scale factor 3.



centre of enlargement

[4]

52 Look at the letters in the word below:

MATHEMATICS

- a) Write down ONE letter which has only 1 line of mirror symmetry.
 b) Write down ONE letter which has order of rotational symmetry order 2.

[2]

53 How many planes of symmetry do each of these 3D shapes have?



[2]

54 $a = \begin{pmatrix} -4 \\ 4 \end{pmatrix}$ and $b = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$

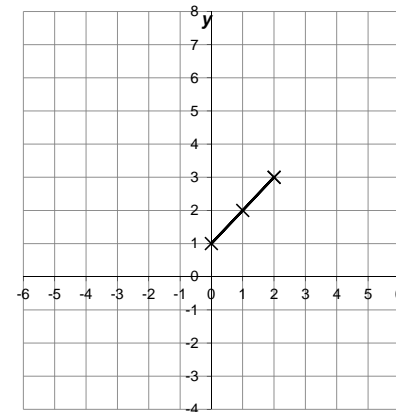
Using the vectors above, work out:

a) $3a - 5b$

b) $4a + 4b$

[4]

55 Triangle XYZ has co-ordinates (2, 3), (0, 1), (1, 2).

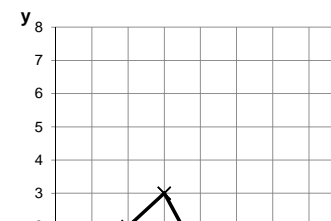


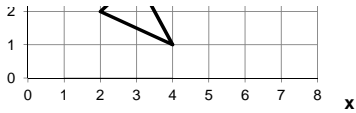
- a) Reflect triangle XYZ in the x axis and label it A.
 b) Rotate triangle XYZ 90° anti-clockwise about the point (0, 0) and label it B.
 c) Translate triangle XYZ with the vector $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$ and label it C.
 d) Enlarge triangle XYZ, scale factor 2, centre of enlargement (0, 0) and label it D.

[8]

56 Triangle XYZ has co-ordinates (3, 3), (2, 2), (4, 1).

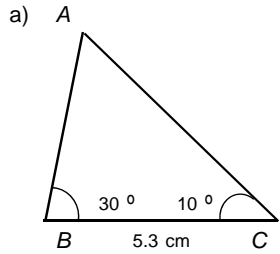
Enlarge triangle XYZ using the centre of enlargement (0, 0) and scale factor 2.



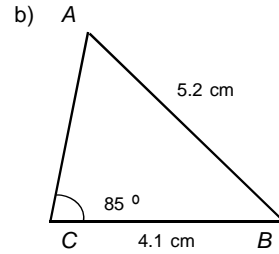


[4]

57 Use a ruler, compass, pencil and protractor to construct the shapes below.
In each question measure and write down the length AC.

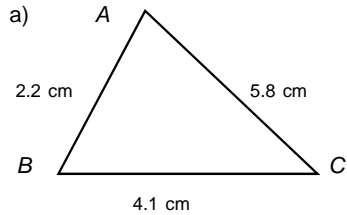


NOT TO
SCALE

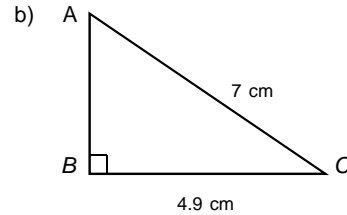


[4]

58 Use a ruler, compass and pencil to construct and label the triangles below.
In each question measure and write down the size of angle BAC.

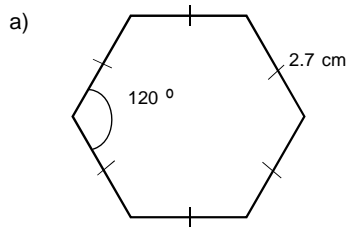


NOT TO
SCALE

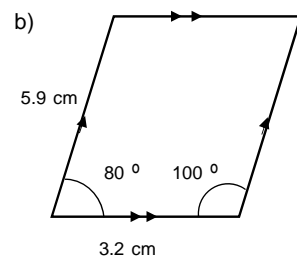


[4]

59 Use a ruler, compass, pencil and protractor to construct the shapes below.



NOT TO
SCALE

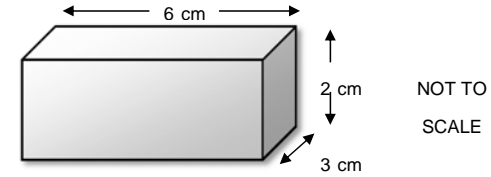


[4]

60 In triangle ABC, AB = 4.4 cm, AC = 5.2 cm and angle ABC = 5°. Show that triangle ABC can be constructed in two different ways.

[4]

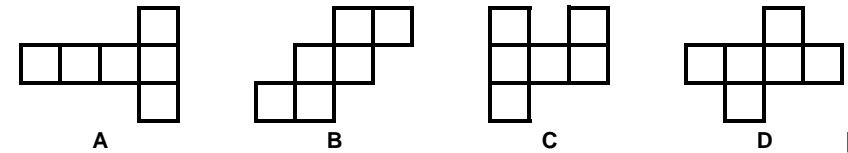
61 Draw an accurate net of this cuboid using a pencil and ruler.



NOT TO
SCALE

[4]

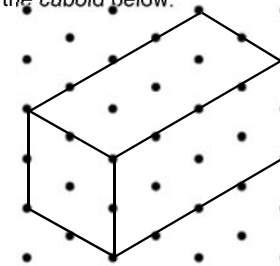
62 Which **two** of these diagrams could be the net of a cube?



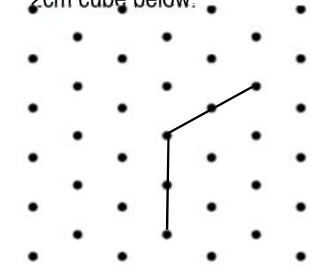
[2]

63 The diagrams below are represented on 1cm isometric paper.

a) Write down the dimensions of the cuboid below.



b) Complete the drawing of a 2cm cube below.

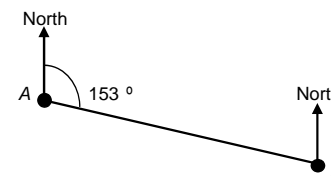


[4]

64 A ship sails from a point A and travels on a bearing of 255° for 2km to a point B. Using a scale of 1cm = 10km make an accurate, labelled scale drawing.

[2]

65 The diagram below shows two points A and B.



Find:

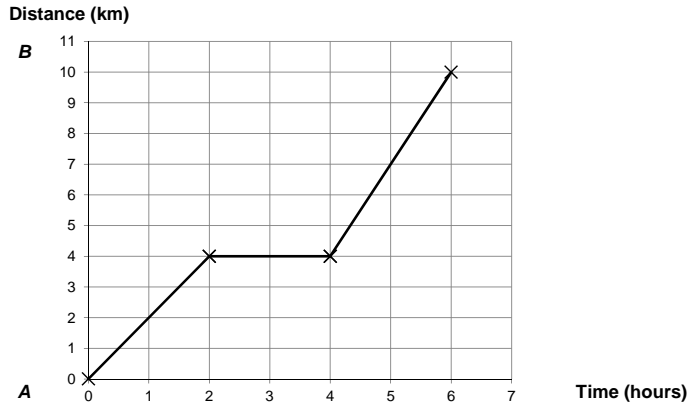
- the bearing of B from A
- the bearing of A from B.

[3]

66 A car travels a distance of 97.5km in 3 hrs and 15 mins.
Work out the average speed of the car. [2]

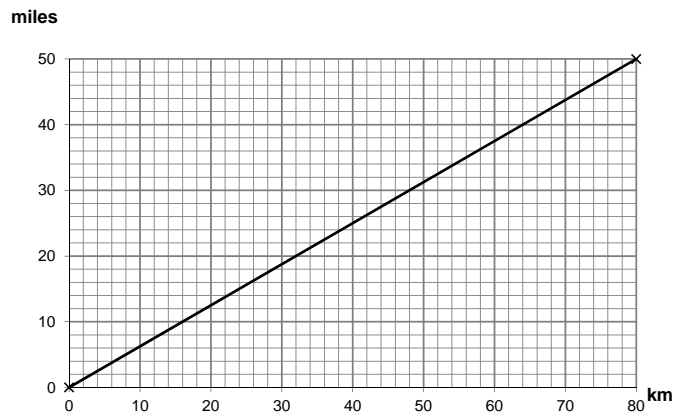
67 A car travels at an average speed of 50km/h for 2 hrs and 15 mins.
Work out the distance travelled. [2]

68 Below is a distance-time graph for a person's journey between towns A and B.



- a) What was the furthest distance the person travelled from town A?
b) What was the total time of the journey?
c) Calculate the average speed, in km/h, for the first stage of the journey. [4]

69 Below is a conversion graph for miles and km.



Use the graph to complete the following:

a) 34 miles = km b) 2 km = miles [2]

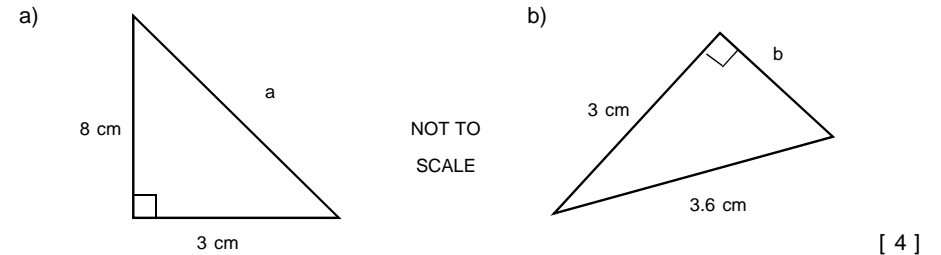
70 A teacher says "10 kilograms (kg) is approximately equal to 22 pounds (lbs)"

- a) Draw a conversion graph for kilograms and pounds using this information.
Kilograms should go on the horizontal axis, with a scale of 0 to 40.
Pounds should go on the vertical axis, with a scale of 0 to 80.

Use your graph to copy and complete the following:

b) 20 kg = lbs c) kg = 66 lbs [6]

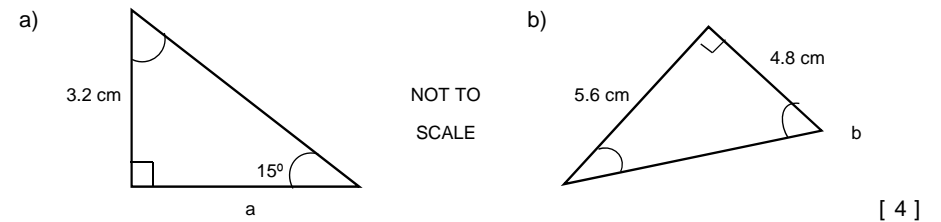
71 Calculate the missing sides in these right-angled triangles :



72 Using a calculator, give the answer to these calculations to 1 decimal place.

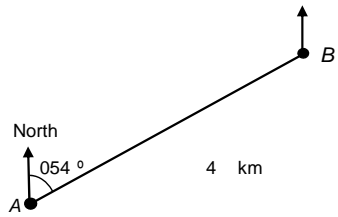
a) $\cos 15^\circ$ b) $\sin^{-1} 0.32$ [2]

73 Find the missing sides and angles to 1 d.p. in the right-angled triangles below.



74 The diagram below shows the journey of a ship that sets sail from A to B.
The ship sails on a bearing of 054° for a distance of 4 km.

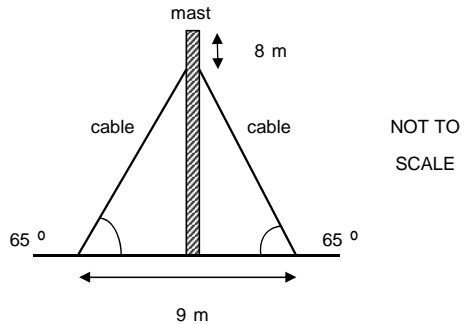
North



- a) How far north of A is B?
 b) How far east of A is B?

[4]

- 75 The diagram shows a vertical mast supported by two cables of equal length. The angle between each cable and the horizontal ground is 65° .



- a) Calculate the combined length of the two cables.
 b) Calculate the total height of the telephone mast.

[4]

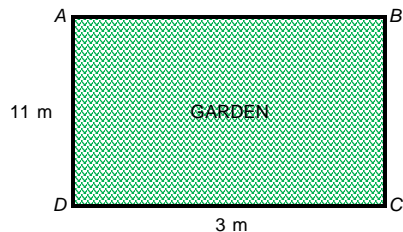
- 76 Complete the following, showing all your construction lines.

- a) Draw an angle of 10° using a protractor, then bisect it using a compass.
 b) Draw a 3 cm line, then use a compass to draw its perpendicular bisector.

[4]

- 77 The diagram below shows a garden ABCD.

The owner wants to plant a tree so that it is nearer to the side AB than AD.
 The owner also wants the tree to be more than 1 metres from point B.

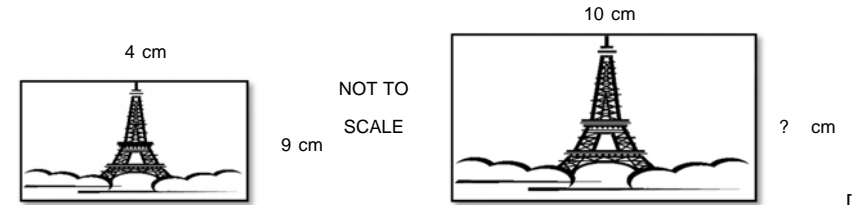


Using a scale of $1\text{ cm} = 2\text{ m}$ make a scale drawing of the garden.

Shade the area where the tree can be planted (showing all construction lines).

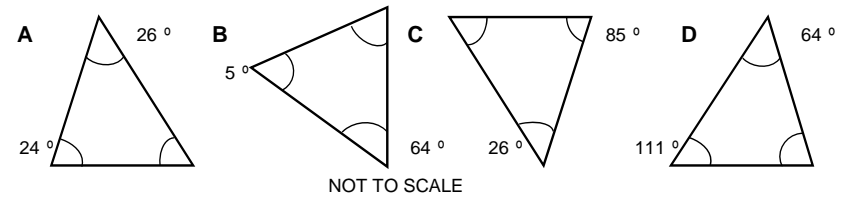
[4]

- 78 Work out the missing length in the enlarged photograph.



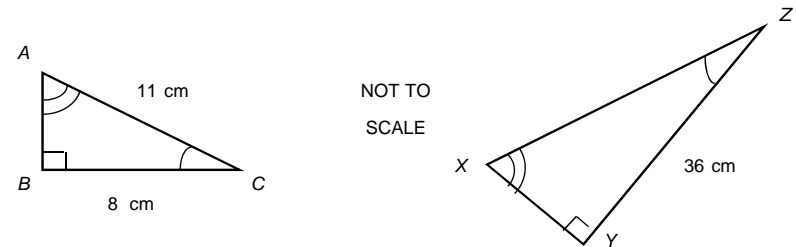
[2]

- 79 Find the pair of similar triangles from the diagrams below:



[2]

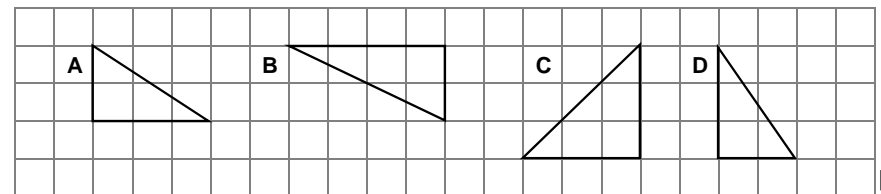
- 80 The triangles below are similar.



- a) Find the length XZ.
 b) How many times bigger is the area of XYZ than ABC?

[4]

- 81 Which of these triangles are congruent?



[2]

1 The table below shows the total number of visitors to three cinemas in a Multiplex.

	Winter	Spring	Summer	Autumn
Cinema 1	7958	3557	3638	5073
Cinema 2	7519	2643	3383	3824
Cinema 3	7129	5243	2141	4084

- a) How many people visited Cinema 2 during the summer?
- b) What is the difference in people visiting Cinema 1 in spring and winter?
- c) In total, how many people visited the three cinemas during the spring?
- d) Which cinema had the fewest visitors across the year?

[4]

2 A questionnaire aims to find out information about a group of students. Students were asked about their height, weight, favourite colour and favourite subject. The results are shown in the data collection sheet below.

Pupil	A	B	C	D	E	F	G	H	I	J	K	L
Colour	Other	Red	Green	Green	Blue	Red	Red	Green	Other	Red	Blue	Green
Height	159	172	143	173	146	149	136	139	143	135	131	133
Weight	50	47	41	66	62	56	48	41	44	50	47	43
Subject	PE	Other	PE	PE	Other	Maths	Other	Other	PE	Other	Art	Maths

Selecting one **qualitative** data question, represent the data in a tally chart. Write a sentence about what you notice about this data.

[4]

3 Some students were asked how many brothers and sisters they had. The results are shown below.

4 5 5 2 0 4 2 4 0 1

Use this data to complete the frequency table below.

siblings	Tally	Frequency
0		
1		

2		
3		
4		
5		
Total		

[4]

4 Some students were asked how long it took to travel to school in the morning. Their times, to the nearest minute, are shown below.

1 25 46 33 5 22 13 39 48 32 42 38 35 7 0 28 1 35

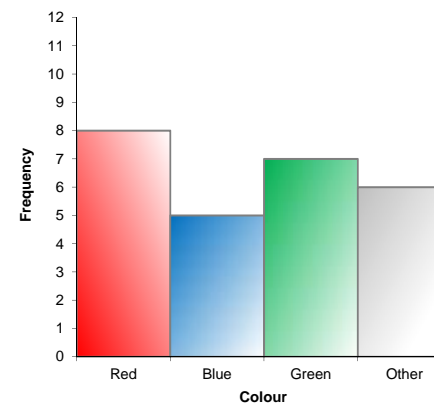
Complete the frequency table:

Time (minutes)	Tally	Frequency
0 - 9		
10 - 19		
20 - 29		
30 - 39		
40 - 49		
Total		

[4]

5 Jim asked his friends about their favourite colour.

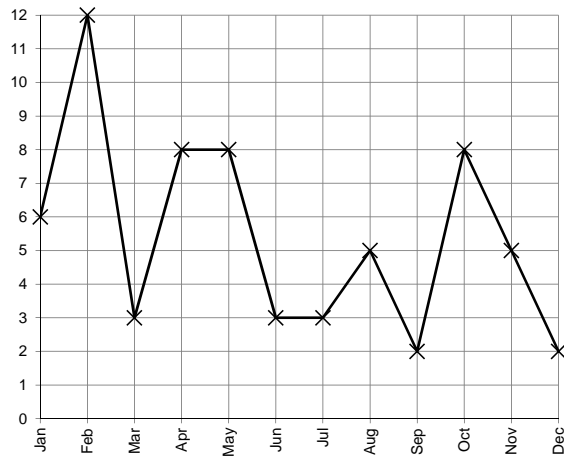
The results are shown in the bar chart below.



- a) What was the favourite colour?
- b) How many people chose green?
- c) What is the difference in the number of people that said red and green?

d) Why do you think a category of "other" has been included? [4]

6 This line graph shows the average rainfall each month, in mm, of a city:



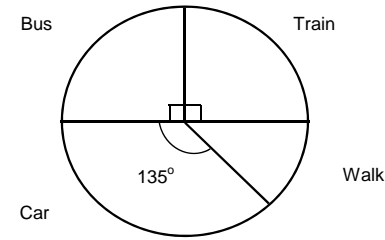
- a) Which month had the highest rainfall?
 - b) What was the change in rainfall between June and July?
 - c) Which months had the same rainfall?
 - d) What is the range of rainfall?
- [4]

7 The pictogram below shows the number of merits received by students in a term.



- a) How many merits did Year 7 receive?
 - b) Which year received the least merits?
 - c) What is the difference in merit totals between Year 8 and Year 9?
 - d) In the previous term Year 8 received 48 merits.
How many symbols would be needed to represent this?
- [4]

8 This pie chart shows how 48 students in Year 7 travel to school each day.



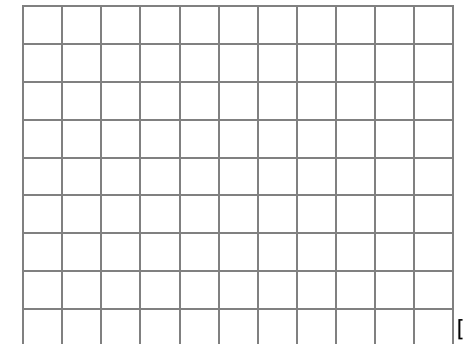
- a) How many pupils travel to school by train?
 - b) What angle represents the pupils who walk to school?
 - c) How many pupils travel to school by car?
 - d) How many more pupils travel to school by car than by bus?
- [4]

9 Students in Year 9 were asked what their favourite subject was.

The results are shown in the frequency table below.

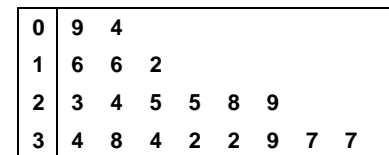
Draw a pie chart to show this information.

Subject	Pupils
Maths	15
Science	15
English	9
PE	12
Other	9
Total	60



[4]

10 This stem and leaf diagram gives the times taken (minutes) when waiting for a bus.



Key		
1	2	= 12

- a) What was the shortest time waited?
 - b) What was the longest time waited?
- [2]

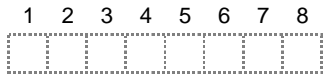
11 Supermarket shoppers were asked how many items they had bought:

6 6 1 3

Find:

- a) the mode
 - b) the median
 - c) the mean
 - d) the range
- [6]

12 A set of 8 numbers has a mean of 6.375, a range of 10 and a median of 5.5.



Write down what the numbers are. [4]

13 Some students recorded how many skipping rope jumps they could do in 10 seconds.

The results for the boys and the girls are shown below.

Girls: 9 3 7

Boys: 6 10

- a) Work out the mean for the girls.
 - b) Work out the range for the girls.
 - c) Work out the mean for the boys.
 - d) Work out the range for the boys.
 - e) Write a sentence to compare the results for the boys and the girls.
- [5]

14 A football team recorded the number of goals scored in 26 matches.

Goals	Frequency
0	1
1	3
2	11
3	11
Total	26

Find:

- a) the mode
 - b) the median
 - c) the mean.
- [4]

15 The test results of 16 students was recorded in a frequency table.

Percentage	Frequency
0 - 19	5
20 - 39	0
40 - 59	1
60 - 79	6

Find:

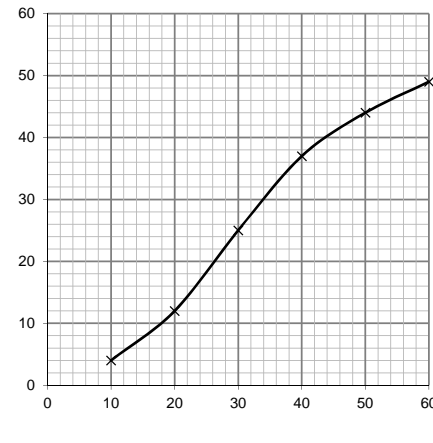
- a) the modal class
- b) the median class
- c) the mean.

80 - 99	4
Total	16

[4]

16 This graph shows the time taken for students to get to school.

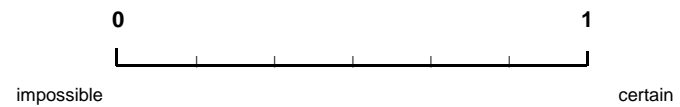
Cumulative Frequency



Time (minutes)	Frequency	Cumulative Frequency
0 - 10	4	4
11 - 20	8	12
21 - 30	13	25
31 - 40	12	37
41 - 50	7	44
51 - 60	5	49

- a) What is the median journey length?
 - b) Find the inter-quartile range.
- [3]

17 A probability scale goes from zero to one:



Indicate on the scale where you would place the following events:

- a) You will throw a 2 on a normal dice.
 - b) You will have homework today.
- [2]

18 A normal unbiased dice is thrown.

Find the following probabilities:

- a) P(3)
 - b) P(not getting a 2)
- [2]

19 A box contains 7 cards with the numbers below.

6	3	8	5	7	11	7		
---	---	---	---	---	----	---	--	--

- a) What is the probability of choosing a card which is less than 4? [2]
 b) What is the probability of choosing a multiple of 11? [2]

20 A bag contains some coloured balls: 7 red, 2 blue, and 9 green.
 A ball is chosen at random.
 Find the probability of picking the following:

- a) a red ball [2]
 b) not a blue ball. [2]

21 The probability that it will rain tomorrow is 0.638
 What is the probability that it will not rain tomorrow? [2]

22 A football team can either win, lose or draw a match.
 The probability that they win their next match is 0.4.
 The probability that they will lose their next match is $\frac{1}{4}$.
 What is the probability that they will draw their next match? [2]

23 A contains three balls numbered 3, 1 and 6.
 The three balls are drawn to generate a three digit number.
 By considering all of the possible outcomes, find the following probabilities:

- a) P(odd 3 digit number) [4]
 b) P(3 digit number greater than 800) [4]

24 Two dice numbered 1 to 6 are thrown and their scores multiplied.
 a) Complete the sample space table below to show all possible outcomes.

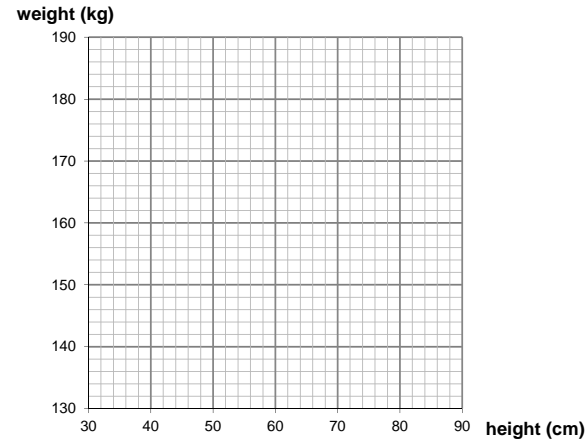
x	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

- b) How many outcomes are there?
 c) Find the probability of getting a score less than 15. [4]

25 The table below shows the weight and height of 10 students.

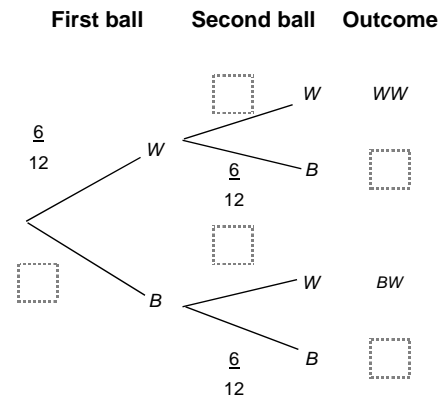
height (cm)	132	172	134	142	154	166	180	130	152	131
weight (kg)	69	81	37	68	75	54	79	67	32	44

Plot the points on the scatter diagram below.



Describe any correlation between the results. [6]

26 A bag contains a selection of coloured balls: 6 white and 6 black.
 A ball is picked at random, replaced, then a second ball chosen.
 Complete the tree diagram below.



Find:

a) $P(WW)$

b) $P(\text{same colour})$

[8]

27 An experiment is done to find out if a dice is fair or biased.

A dice is thrown and the results are recorded in the frequency table below.

Score	1	2	3	4	5	6
Frequency	0	11	12	7	4	1

Based on these results, find the relative frequencies of the following.

a) $P(4)$

b) $P(6 \text{ or } 2)$

Write down, with a reason, if you think that the dice is biased or unbiased.

[3]