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Home Learning 6.4 Date Due:.....

1 Find the distance travelled by a hiker who walks for 3 hours at an average speed of 2.5 mph.

2 Find the time taken to drive a car 125 km at an average speed of 75 km/h.

3 A runner runs a 1000 m race in 3 minutes 20 seconds. Find his average speed in m/s.

4 Find the density of a gold ingot that has a mass of 4825 g and a volume of 250 cm^3.

5 The density of sea water is 1.05 g/cm^3. If a bucket with a capacity of 5 litres is filled with seawater, find the mass of the water in the bucket. Give your answer in kilograms.

6 The density of cork is 0.25 g/cm^3. Find the volume of a block of cork that has a mass of 120 g.

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Home Learning 1.1 Date Due:.....

1 Write down the first four terms of each sequence whose nth term is given below.

a $3n + 1$ b $4n - 2$ c $n^2 + 7$ d $n(n + 3)$ e $(n + 3)(n - 1)$

2 Find the nth term of each of the following sequences.

a 5, 7, 9, 11, ... b 2, 5, 8, 11, ... c 1, 4, 9, 16, ... d 3, 6, 11, 18, ...

3 Find the nth term of each of the following sequences of fractions.

a $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \ldots$ b $\frac{1}{3}, \frac{2}{5}, \frac{3}{7}, \frac{4}{9}, \ldots$

4 Find the nth term of each of the following sequences.

a 3.5, 5, 6.5, 8, 9.5, ... b 5.1, 7.2, 9.3, 11.4, ... c 3.6, 6.1, 8.6, 11.1, ...

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Home Learning 1.2 Date Due:.....

Look at the following diagrams.

Diagram	1	2	3	4	5	6
Crosses	1	5	13			

a Before drawing a diagram, can you predict, from the table, the number of crosses which are in Diagram 4?

b Draw Diagram 4, and count the number of crosses there are. Were you right?

c Now predict the number of crosses for Diagrams 5 and 6.

d Check your results for part **c** by Drawing diagrams 5 and 6.

e Write down the term-to-term rule for the sequence of crosses. (**Hint** $4 = 2^2$, $8 = 2^3$)

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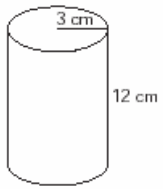
Home Learning 6.4 Date Due:.....

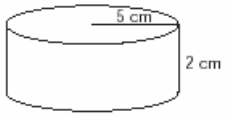
In this exercise take $\pi = 3.142$ or use the π key on your calculator.

1 Calculate the volume of each of the following cylinders. Give your answers correct to three significant figures.

a



b



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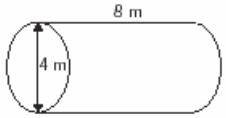
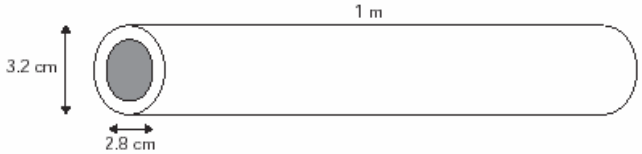


2 The diagram below shows a metal pipe of length 1 m. It has an internal diameter of 2.8 cm, and an external diameter of 3.2 cm. Calculate the volume of metal in the pipe. Give your answer correct to the nearest cubic centimetre.



3 A cylindrical can holds 2 litres of oil. If the height of the can is 25 cm, calculate the radius of the base of the can. Give your answer correct to one decimal place.

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Home Learning 1.3 Date Due:.....

1 Write down the inverse of each of the following functions.

a $x \to 3x$ **b** $x \to x + 8$ **c** $x \to 6 + x$ **d** $x \to \frac{x}{2}$ **e** $x \to 2x + 1$ **f** $x \to 4x + 3$ **g** $x \to 3x - 5$

2 Write down two different types of inverse function and show that they are self inverse functions.

3 Write down the inverse of each of the following functions.

a $x \to 3(x + 5)$ **b** $x \to \frac{1}{2}(x + 5)$ **c** $x \to \frac{(6 + x)}{4}$

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Home Learning 1.4 Date Due:.....

1 Sketch graphs to show how the depth of water varies with time when water drips steadily into the following containers.

a b c

2 Sketch distance–time graphs to illustrate each of the following situations.

a A car accelerating away from traffic lights.

b A train slowing down to a standstill in a railway station.

c A car travelling at a steady speed and then having to accelerate to overtake another vehicle before slowing down to travel at the same steady speed again.

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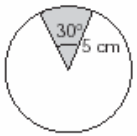
Home Learning 6.3 Date Due:.....

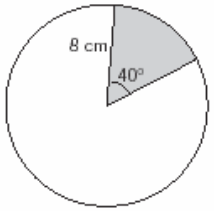
In this exercise take $\pi = 3.142$ or use the π key on your calculator.

1 Calculate **(i)** the length of the arc and **(ii)** the area of the sector for each of the following circles. Give your answers correct to three significant figures.

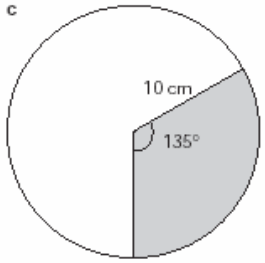
a



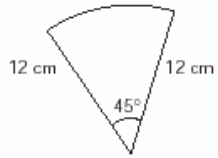
b



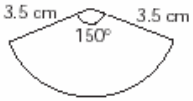
c



2 Calculate the total perimeter of the sector on the right. Give your answer correct to three significant figures.



3 Calculate the area of the sector below. Give your answer correct to three significant figures.



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Home Learning 6.2 Date Due:.....

1 Express each of the following in mm^2.

a $3\ cm^2$ **b** $8\ cm^2$ **c** $4.5\ cm^2$ **d** $0.8\ cm^2$

2 Express each of the following in m^2.

a $40\,000\ cm^2$ **b** $70\,000\ cm^2$ **c** $32\,000\ cm^2$ **d** $5000\ cm^2$

3 Express each of the following in cm^3.

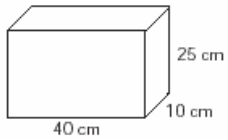
a $2\ m^3$ **b** $9\ m^3$ **c** $3.7\ m^3$ **d** $0.3\ m^3$

4 Express each of the following in litres.

a $8000\ cm^3$ **b** $12\,000\ cm^3$ **c** $23\,500\ cm^3$ **d** $250\ cm^3$

5 A rectangular park is 620 m long and 340 m wide. Find the area of the park in hectares.

6 Calculate the volume of the box on the right. Give your answer in litres.



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Home Learning 2.1 Date Due:.....

1 Convert each of the following pairs of fractions to equivalent fractions with a common denominator. Then work out each answer, cancelling down and/or writing as a mixed number if appropriate.

a $2\frac{6}{5} + 2\frac{1}{4}$ **b** $2\frac{7}{3} + 1\frac{1}{8}$ **c** $2\frac{5}{8} - 1\frac{5}{12}$ **d** $3\frac{5}{12} - 1\frac{3}{4}$

2 Work out each of the following. Cancel before multiplying when possible.

a $\frac{1}{5} \times \frac{3}{8}$ **b** $\frac{7}{5} \times \frac{3}{4}$ **c** $\frac{7}{8} \times \frac{3}{16}$ **d** $4\frac{1}{5} \times 1\frac{3}{7}$ **e** $2\frac{3}{8} \times 1\frac{3}{5}$

3 Work out each of the following. Cancel at the multiplication stage when possible.

a $\frac{1}{4} \div \frac{1}{3}$ **b** $\frac{3}{16} \div \frac{9}{14}$ **c** $\frac{1}{6} \div \frac{1}{3}$ **d** $2\frac{5}{8} \div \frac{7}{16}$ **e** $2\frac{3}{5} \div \frac{3}{10}$

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Home Learning 2.2 Date Due:.....

1 How much would you have in the bank if you invest as follows?

a £450 at 3% interest per annum for 4 years.

b £6000 at 4.5% interest per annum for 7 years.

2 Stocks and shares can decrease in value as well as increase. How much would your stocks and shares be worth if you had invested as follows?

a £1000, which lost 14% each year for 3 years.

b £750, which lost 5.2% each year for 5 years.

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Home Learning 5.7 Date Due:.....

Copy and complete each table of values given below.

a Complete each table including the totals.

b Calculate an estimate of each mean.

1

Age, A (years)	Frequency, f	Mid-value, x, of age (years)	$f \times x$ (years)
11–12	5	12	60
13–14	8		
15–16	12		
17–18	5		
	Total =		Total =

2

Time, t, (hours)	Frequency, f	Mid-value, x, of time (hours)	$f \times x$ (hours)
$0 < t \leq 2$	2	1	2
$2 < t \leq 4$	7		
$4 < t \leq 6$	10		
$6 < t \leq 8$	5		
	Total =		Total =

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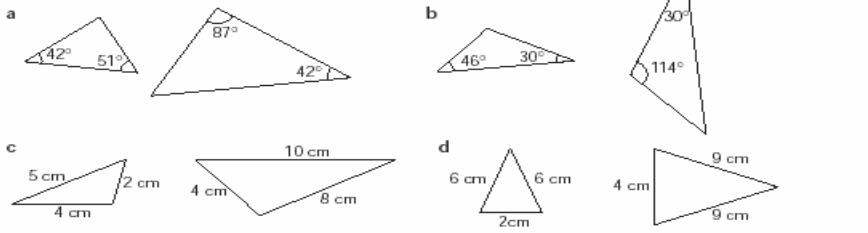
Home Learning 6.1 Date Due:.....

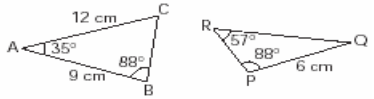
1 State whether each of the pairs of triangles below are similar.

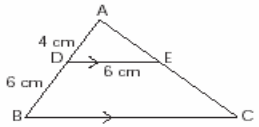


2 **a** Explain why triangle ABC is similar to triangle PQR.

b Find the length of the side QR.

3 In the triangle below DE is parallel to BC. Find the length of BC.





Home Learning 2.3 Date Due:.....

1 A packet of biscuits claims to be 24% bigger! It now contains 26 biscuits. How many did it have before the increase?

2 After a 10% price decrease, a hi-fi system now costs £288. How much was it before the decrease?

3 This table shows the cost of some items after 17½% VAT has been added. Work out the cost of each item before VAT.

Item	Cost inc VAT	Item	Cost inc VAT
Radio	£112.80	Cooker	£329
Table	£131.60	Bed	£376

4 A pair of designer jeans is on sale at £96, which is 60% of its original price. What was the original price?

5 A pair of boots, originally priced at £60, were reduced to £36 in a sale. What was the percentage reduction in the price of the boots?

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Home Learning 2.4 Date Due:.....

1 In 4 hours a man earns £45. How much does he earn in 5 hours?

2 A man walking one dog takes 20 minutes to walk one mile. How long will it take him to cover one mile if he walks two dogs?

3 In a week, grass grows 21 mm. How much does it grow in 4 days?

4 Fifty litres of petrol costs £35. How much will 20 litres of petrol cost?

5 Eight men dig a ditch in 9 days. How long would six men take?

6 A camping party of three has enough food to last them 4 days. If another person joins the party, how long will the food last?

7 At £6 an hour, Jack takes 16 hours to earn enough for a guitar. If he had earned £8 an hour, how long would it have taken him to earn the money?

8 Three bell ringers ring a tune on 6 bells in 5 minutes. How long would four bell ringers take to ring the same tune?

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Home Learning 5.6 Date Due:.....

For each table of data:

a Copy and complete the cumulative frequency table.

b Draw the cumulative frequency graph.

c Use your graph to estimate the median and the interquartile range.

1 The height of 100 plants.

Height, h (cm)	Number of plants	Height, h (cm)	Cumulative frequency
$0 < h \leq 10$	6	$h \leq 10$	
$10 < h \leq 20$	24	$h \leq 20$	
$20 < h \leq 30$	27	$h \leq 30$	
$30 < h \leq 40$	30	$h \leq 40$	
$40 < h \leq 50$	13	$h \leq 50$	

2 The time that the school bus is late on 40 days.

Time, t (min)	Number of days	Time, t (min)	Cumulative frequency
$0 < t \leq 5$	12	$t \leq 5$	
$5 < t \leq 10$	15	$t \leq 10$	
$10 < t \leq 15$	6	$t \leq 15$	
$15 < t \leq 20$	7	$t \leq 20$	

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Home Learning 2.5 Date Due:.....

1 Two similar, plane shapes, A and B, have lengths in the ratio 1 : 4. The area of shape A is 10 cm^2. What is the area of shape B?

2 Two similar, plane shapes, P and Q, have lengths in the ratio 1 : 2. The area of shape Q is 100 cm^2. What is the area of shape P?

3 Two similar solids, C and D, have lengths in the ratio 1 : 3. The volume of solid C is 15 cm^3. What is the volume of solid D?

4 Two similar solids, R and S, have lengths in the ratio 1 : 2. The volume of solid S is 72 cm^3. What is the volume of solid R?

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Home Learning 2.6 Date Due:.....

Say which of these statements is true. If it is not true, give a counter-example.

a The square of a number between 0 and 1 is also between 0 and 1.

b The square of a number between 0 and –1 is also between 0 and –1.

c Dividing any number by a number between 0 and 1 always gives a bigger answer.

d Dividing any positive number by a number between 0 and 1 always gives a bigger answer.

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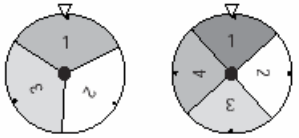
Home Learning 5.5 Date Due:.....

1 Two fair spinners are spun and the scores are added together to get a total score. This is recorded in the two-way table, shown below.



	Second spinner			
	+	1	2	3
First spinner	1	2	3	
	2	3		
	3			
	4			

a Complete the table of total scores.

b List all the total scores which are prime numbers.

c State the most likely total scores.

d Write down the probability of getting a total score of 7. Give your answer as a fraction in its simplest form.

e Write down the probability of getting a total score of 5. Give your answer as a fraction in its simplest form.

2 A year group recorded the days of the week on which they were born. Here are the results.

Day	Boys	Girls
Monday	23	19
Tuesday	19	25
Wednesday	27	28
Thursday	31	26
Friday	35	41
Saturday	14	17
Sunday	12	11
Total	161	167

a Write a comment on the births of boys and girls.

b Write a comment about the number of births on different days of the week.

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Home Learning 2.7 Date Due:.....

1 **a** Find, as decimals, the reciprocals of all the integers from 21 to 25.

b Which of the reciprocals are recurring decimals?

2 Find the reciprocals of each of the following numbers. Round your answers if necessary.

a 50 **b** 0.004 **c** 60 **d** 0.625

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Home Learning 2.8 Date Due:.....

1 By rounding each value to one significant figure, estimate the answer to each of the following.

a 0.83×793 **b** $618 \div 0.32$ **c** $812 \div 0.38$

d 0.78×0.049 **e** $(38 \times 3.2) \div 0.487$ **f** $(2.7 + 6.3) \times (0.52 - 0.17)$

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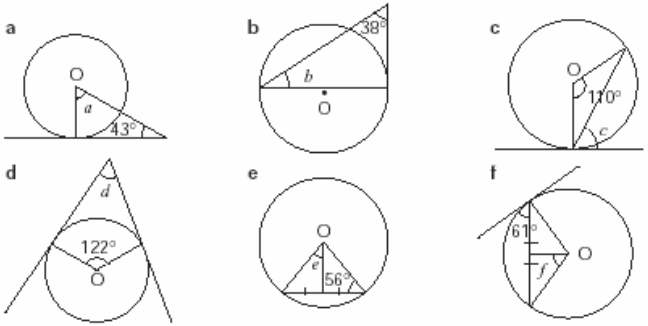
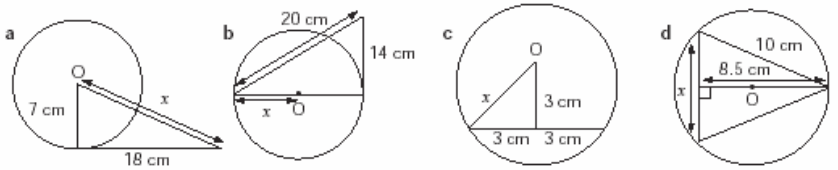
Home Learning 4.5 Date Due:.....

1 Calculate the size of the lettered angle in each of the following diagrams.



2 Use Pythagoras' theorem to calculate the length x in each of the following diagrams. Give your answers to one decimal place.



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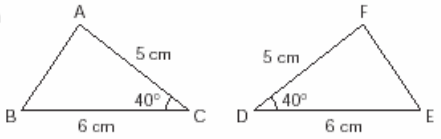
Home Learning 4.4 Date Due:.....

1 Show that each of the following pairs of triangles are congruent. Give reasons for your answers and state which condition of congruence you are using.

a



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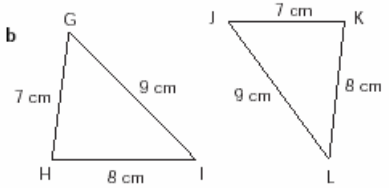
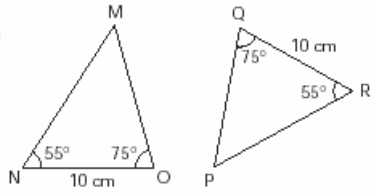
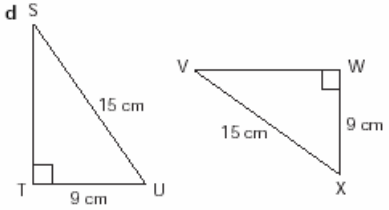


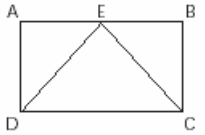
c



d



2 ABCD is a rectangle and E is the mid-point of AB.



Explain why ΔAED is congruent to ΔBEC.

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Mark: .....

Home Learning 3.1 Date Due:.....

1 $4x + y = 14$
$2x + y = 8$

2 $6x + 3y = 33$
$2x + 3y = 21$

3 $3x + y = 10$
$8x - y = 1$

4 $5x + 2y = 22$
$7x - 2y = 2$

5 $5x - 4y = 36$
$2x - 4y = 6$

6 $5x + 3y = 50$
$9x - 3y = 48$

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Home Learning 3.2 Date Due:.....

1 $3x + y = 8$
$2x + 5y = 27$

2 $6x + 4y = 36$
$2x + y = 11$

3 $5x + 2y = 47$
$3x - y = 26$

4 $3x + y = 24$
$5x + 2y = 41$

5 $7x - 4y = 16$
$x - y = 1$

6 $8x - 4y = 36$
$x + 3y = 8$

Mark: .....

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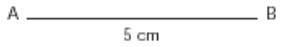
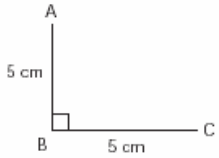
Home Learning 4.3 Date Due:.....

1 Using a ruler and compasses, construct the locus which is equidistant from the points A and B.



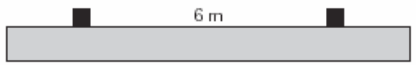
2 Using a ruler and compasses, construct the locus which is equidistant from the perpendicular lines AB and BC.



3 Draw a diagram to show the locus of a set of points which are 4 cm or less from a fixed point X.

4 Two alarm sensors, 6 m apart, are fitted to the side of a house, as shown below. The sensors can detect movement to a maximum distance of 5 m.

Draw a scale drawing to show the region that can be detected by both sensors. Use a scale of 1 cm to 1 m.



Home Learning 3.3 Date Due:.....

1 Find the first five terms of each of the following sequences given by:

a $T(n) = n^2 + 7n - 3$ **b** $T(n) = 5n^2 + 3n + 1$ **c** $T(n) = 6n^2 - 5n$

2 Find the nth term for each of the following quadratic sequences.

a 13, 25, 41, 61, 85 **b** 12, 18, 26, 36, 48 **c** 7, 14, 27, 46, 71

d $\frac{1}{3}, \frac{2}{7}, \frac{3}{13}, \frac{4}{21}, \frac{5}{31}$ **e** $\frac{1}{5}, \frac{4}{18}, \frac{9}{31}, \frac{16}{48}, \frac{25}{69}$ **f** $\frac{12}{21}, \frac{25}{46}, \frac{44}{83}, \frac{69}{132}, \frac{100}{193}$

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Home Learning 3.4 Date Due:.....

1 Solve each of the following equations.

a $\frac{3x}{5} = 12$ **b** $\frac{3t}{5} = 6$ **c** $\frac{6m}{8} = 18$ **d** $\frac{2x}{5} = 8$ **e** $\frac{2w}{7} = 6$

2 Solve each of the following equations.

a $\frac{x+1}{3} = 5$ **b** $\frac{x+5}{4} = 8$ **c** $\frac{2x+4}{5} = 6$ **d** $\frac{3x+1}{8} = 2$

3 Solve each of the following equations.

a $\frac{x-1}{3} = \frac{x+1}{4}$ **b** $\frac{2x+3}{3} = \frac{x-2}{2}$ **c** $\frac{3x-2}{5} = \frac{x+4}{2}$

4 Solve each of the following equations.

a $\frac{5}{x-1} = \frac{3}{x+1}$ **b** $\frac{4}{3x-2} = \frac{5}{2x+1}$ **c** $\frac{7}{5x-2} = \frac{5}{3x+5}$

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Home Learning 4.2 Date Due:.....

1 A plane flies due east for 120 km from airport A to airport B. It then flies due north for 280 km to airport C. Finally, it flies directly back to airport A. Calculate the direct distance from airport C to airport A. Give your answer to the nearest kilometre.

2 The length of a football pitch is 100 m and the width of the pitch is 80 m. Calculate the length of a diagonal of the pitch. Give your answer to the nearest metre.

3 The regulations for the safe use of ladders states: For a 6 m ladder, the foot of the ladder must be placed between 1.5 m and 2.2 m from the building.

a What is the minimum height the ladder can safely reach up the side of a building?

b What is the maximum height the ladder can safely reach up the side of a building?

4 Calculate the area of an equilateral triangle whose side length is 10 cm. Give your answer to one decimal place.

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Home Learning 3.5 Date Due:.....

1 Solve the following inequalities and illustrate their solutions on number lines.

a $5x + 7 \geq 22$ **b** $2x - 3 \leq 10$ **c** $4x + 3 < 11$

d $2(x + 4) > 20$ **e** $4(3t + 7) \leq 16$ **f** $2(5x - 4) \geq 17$

2 Write down the values of x that satisfy the conditions given.

a $2(4x + 3) < 50$, where x is a positive, prime number.

b $2(3x - 1) \leq 60$, where x is a positive, square number.

c $4(5x - 3) \leq 100$, where x is positive but not a prime number.

3 Solve the following inequalities and illustrate their solutions on number lines.

a $5x - 4 < 11$
$x > -1$

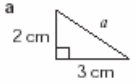
b $3(2x + 5) \leq 9$
$x > -4$

Mark: .....

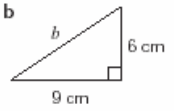
Home Learning 4.1 Date Due:.....

1 Calculate the length of the hypotenuse in each of the following right-angled triangles. Give your answers to one decimal place.

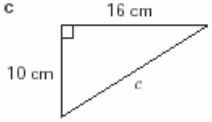
a



b

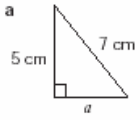


c

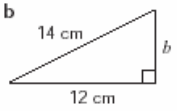


2 Calculate the length of the unknown side in each of the following right-angled triangles. Give your answers to one decimal place.

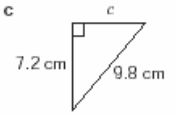
a

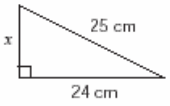


b



c



3 **a** Calculate x in the right-angled triangle shown on the right.

b Calculate the area of the triangle.