



FALKLAND
ISLANDS
COMMUNITY
SCHOOL

Mathematics department

To support our Year 9 students over the coming weeks of uncertainty we have provided a pack of works for students to work through. Students normally have 4 hours of mathematics instruction each week and this should remain the practice whilst working at home. Students should aim to complete 2 worksheets (minimum) from this booklet during each hour session.

I wrote to you earlier in the year to announce that we are subscribed to an online package known as MathsWatch. It contains short video tutorials, online interactive self-marking questions and access to the worksheets which are provided in this booklet. The booklet provided contains both work that students have already covered (recap/revision work) and materials for topics not yet covered but that would be covered during Year 9 (preparation work).

The video tutorials are short animations that are 3-7mb in size. They provide examples that students are expected to write down and listen to/watch and questions to try that the animation will then explain. Students should watch the video, answer the online questions associated with the video and then complete the respective worksheet in this pack.

Answer packs will be emailed to parents by the FICS Secretary.

www.vle.mathswatch.co.uk

Username = AExample@falklandics


Password = changeme



Mr Roberts (GRoberts@secondary.ac.fk) can be contacted for queries and questions relating to mathematics.

There is a MathsWatch Guide also enclosed.

First things first, let's log in
Please navigate to vle.mathswatch.co.uk using your preferred browser (we do recommend Google Chrome but IE, Safari and others should work just as well).
You will be presented with this login page:



Login

Username

Password

[View Demo](#)

[Login](#)

To login it is the first letter of your first name followed by your surname with the schools login. Your password will be 'changeme' unless you have already changed it! So our best mathematician Ann Example would login like this:

Username: AExample@falklandics

Password: changeme

Keeping track

The "My Progress" section will help you stay in control of your progress and achievements.

My Progress									
Progress Summary									
Topic	Questions Answered	Questions Watched	Acquired Skills	Mastered Skills	Score	Time Period	Grade	Topic	Last Attempted
Place Value	15	16	17	18	19	20	21	22	23
Ordering Integers	15	16	17	18	19	20	21	22	23
Ordering Decimals	15	16	17	18	19	20	21	22	23
Reading Scales	15	16	17	18	19	20	21	22	23
Simple Mathematical Notation	15	16	17	18	19	20	21	22	23
Real-Life Tables	15	16	17	18	19	20	21	22	23
Real-Life Tables	15	16	17	18	19	20	21	22	23
Introduction to Algebraic Conventions	15	16	17	18	19	20	21	22	23

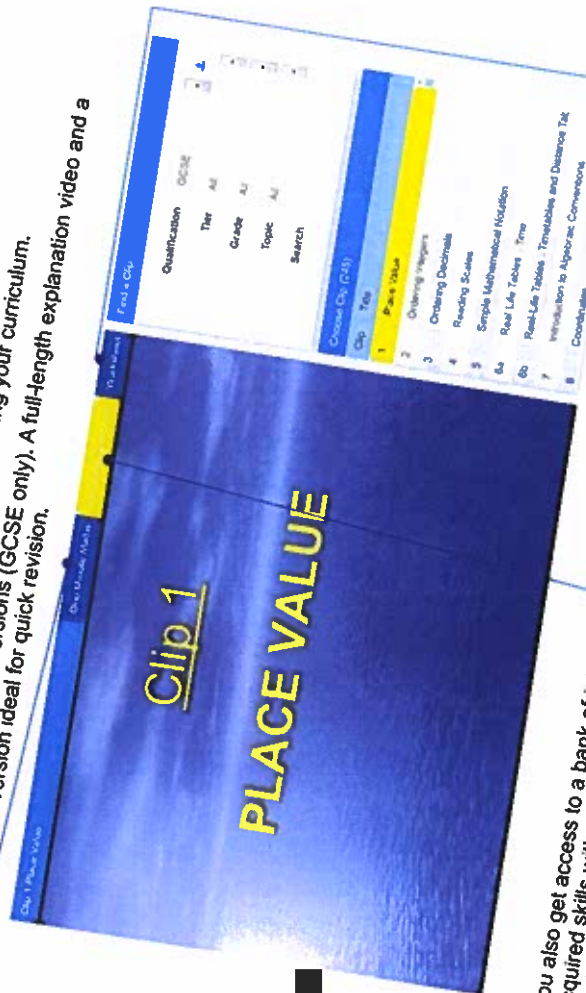
Using the various filtering options, you can quickly identify your areas of strength and those in need of further development.

Clicking on the column headers can also help you sort the data in a more convenient way. This can be used very effectively to quickly remind yourself of which topics you recently covered, as well as of those that you haven't tackled yet.



Working independently

The "Videos" section gives access to lessons covering your curriculum. Each lesson comes in two versions (GCSE only). A full-length explanation video and a One-Minute version ideal for quick revision.



You also get access to a bank of interactive questions allowing you to test your newly acquired skills with real exam-type questions. With immediate feedback and the ability to even experience of what answering all types of exam questions is really like.

Please note that our marking bots have been programmed to attribute marks just like a human examiner would. If at any stage you feel that your answers aren't getting the correct amount of marks, please speak to your Maths teacher. They will either find what is missing/wrong in your answer or simply contact us to have it fixed.

Finally, as if this wasn't enough, you also have a PDF worksheet full of practice questions available. Most schools make the answers to these available on their own VLE. Alternatively, speak to your teacher and they will guide you on how best to use these extra questions.

Use in school and at home!!!

KS3 and KS4

Working independently

The “Videos” section gives access to lessons covering your curriculum.

Each lesson comes in two versions (GCSE only). A full-length explanation video and a One-Minute version ideal for quick revision.



The screenshot shows the MathsWatch interface. The main area displays a video player for 'Clip 1: PLACE VALUE'. The video has a blue background with the text 'Clip 1' and 'PLACE VALUE' in yellow. The top navigation bar includes 'Clip 1: Place Value', 'One Minute Maths', 'Interactive Questionbank', and 'Worksheet'. On the right, there is a 'Find a Clip' section with filters for Qualification (GCSE), Tier (All), Grade (All), and Topic (All), along with a search bar. Below this is a 'Choose Clip (245)' section with a table of clips:

Clip	Title
1	Place Value
2	Ordering Integers
3	Ordering Decimals
4	Reading Scales
5	Simple Mathematical Notation
6a	Real-Life Tables - Time
6b	Real-Life Tables - Timetables and Distance Tab
7	Introduction to Algebraic Conventions
8	Coordinates

You also get access to a bank of interactive questions allowing you to test your newly acquired skills with real exam-type questions. With immediate feedback and the ability to even mark your working when needed, our system is the only one of its kind. You will get a realistic experience of what answering all types of exam questions is really like.

Please note that our marking bots have been programmed to attribute marks just like a human examiner would. If at any stage you feel that your answers aren't getting the correct amount of marks, please speak to your Maths teacher. They will either find what is missing/wrong in your answer or simply contact us to have it fixed.

Finally, as if this wasn't enough, you also have a PDF worksheet full of practice questions available. Most schools make the answers to these available on their own VLE. Alternatively, speak to your teacher and they will guide you on how best to use these extra questions.

Tips and advice tutorials:

You will find in the “Extras” section help on how to input certain type of answers and on how to use our construction tools.

How to type powers



How to type fractions



How to type mixed numbers



How to use the construction tools



Interactive questions

Our interactive questions have been designed with the sole aim of providing you with the most realistic experience of what exam questions are really like.

You will therefore find a rich variety of question types involving:

- Multiple choice answers
- Single answer inputs
- Multi-step answers
- 'Show that' answers
- Drawing answers

Many of our multi-step questions will require you to show your working in order to score full marks, just like in a real exam. Our marking bots have been programmed to mark your answer just as an examiner would.

Here is an example of one of those questions:

Clip 219 Vectors - Question 19

[Hint](#)
[Return to Vectors](#)

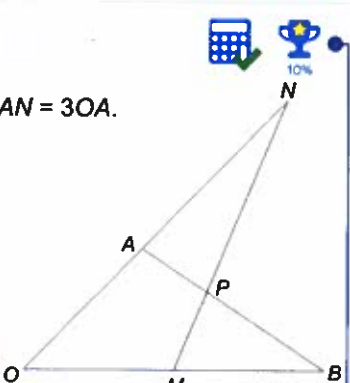
Standard Questions



[1](#)
[2 ✓](#)
[3 ✓](#)
[4](#)
[5](#)
Harder Questions

[7 ✓](#)
[8 ✓](#)
[9 ✓](#)
[10 ✓](#)
[11](#)

Question Progress

OAN, OMB, APB and MPN are straight lines and $AN = 3OA$.
 M is the midpoint of OB .
 $\vec{OA} = \mathbf{a}$ $\vec{OB} = \mathbf{b}$
 $\vec{AP} = k\vec{AB}$ where k is a scalar quantity.
 Express \vec{AB} and \vec{MN} in terms of \mathbf{a} and \mathbf{b} .
 Express \vec{MP} in terms of \mathbf{a} , \mathbf{b} and k .
 Finally, find the value of k .



[Submit Answer](#)

You will have noticed the trophy icon with its percentage value. This informs you of the success rate of all MathsWatch users who have attempted this question so far and therefore gives you a good indication of the challenge it presents.

For our most challenging questions you will also find a 'Hint' tab to help you if needed. Simply hover over it with your mouse to reveal one or two hints to help you on your way.

We sometimes hear this comment from students about our marking: *"I am sure I got it right but MathsWatch is marking it wrong and not giving me all the marks!!!"*

In 99.9% of the cases, if MathsWatch marks it wrong (or only gives partial marks) then a real examiner would probably do the same. If this happens, please see your teacher. They will soon find out why your answer isn't getting full marks. Or, they will contact us to query the answer on your behalf. Please note that we are unable to treat requests emailed to us directly by students.

Answering multi-step questions

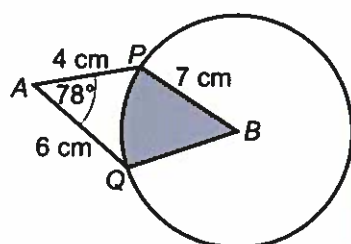
The type of questions students often find the hardest to tackle are the multi-step ones. Here is an example:

Question Progress



Submit Answer

The point B is at the centre of the circle.
The points P and Q are on the circumference of the circle.



Calculate the area of the shaded sector.
Take π to be 3.142 in your working.
Give your final answer to 1 decimal place.

The ingenuity of MathsWatch is that it lets you submit each of your working steps, informing you whether or not you are heading in the right direction. A bit like a teacher would.

Here I tried using the cosine rule and clicked "Submit Answer". The 2 marks allocated suggest I am on the right path:

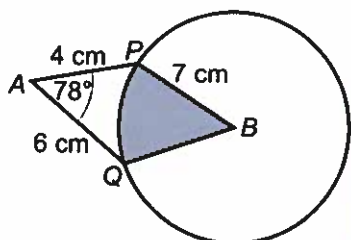
Question Progress

2 / 9 Marks



Submit Answer

The point B is at the centre of the circle.
The points P and Q are on the circumference of the circle.



Calculate the area of the shaded sector.
Take π to be 3.142 in your working.
Give your final answer to 1 decimal place.

$$PQ^2 = 6^2 + 4^2 - 2 \times 6 \times 4 \times \cos 78^\circ$$

Encouraged with these first 2 marks, I carry on with my working and submit my next line:

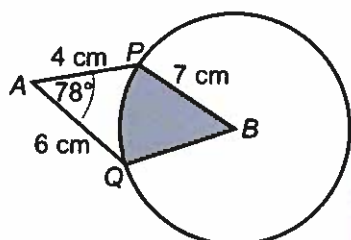
Question Progress

4 / 9 Marks



Submit Answer

The point B is at the centre of the circle.
The points P and Q are on the circumference of the circle.



Calculate the area of the shaded sector.
Take π to be 3.142 in your working.
Give your final answer to 1 decimal place.

$$PQ^2 = 6^2 + 4^2 - 2 \times 6 \times 4 \times \cos 78^\circ$$

$$PQ^2 = 42.02 \text{ so } PQ = 6.48$$

Yes!!! I can do this. I can now merrily proceed with my logical steps until I achieve the full 9 marks for this question.

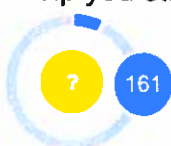
Only MathsWatch can cope with such a level of sophistication and guidance when it comes to helping you achieve your true potential. So from now on, when it comes to Maths revision, don't just watch it, MathsWatch it!!!

Keeping track

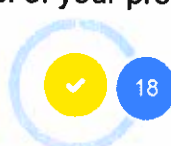
The "My Progress" section will help you stay in control of your progress and achievements.



Topics Watched



Questions Answered



Acquired Skills



Mastered Skills

Search By Video Name		Qualification	Tier	Grade	Topic	Time Period
<input type="text" value="Search Videos"/>		<input type="text" value="GCSE"/>	<input type="text" value="All"/>	<input type="text" value="All"/>	<input type="text" value="All"/>	<input type="text" value="All"/>

#	Skill	Video	Last Watched	Views	OMM	Interactive Questions	Last Attempted
1	★	Place Value	9:15 11/9/2018	1	0	29 / 29	21:02 11/9/2018
2	★	Ordering Integers		0	1	11 / 11	21:14 11/9/2018
3	★	Ordering Decimals	18:07 12/9/2018	1	0	20 / 20	15:50 13/9/2018
4	★	Reading Scales	17:41 10/9/2018	1	0	17 / 17	16:09 13/9/2018
5	✓	Simple Mathematical Notation	15:53 13/9/2018	1	0	20 / 20	16:17 13/9/2018
6a	★	Real-Life Tables - Time	16:50 13/9/2018	1	0	23 / 23	16:58 13/9/2018
6b	★	Real-Life Tables - Timetables and Distance Tables	18:40 13/9/2018	1	0	19 / 19	18:50 13/9/2018
7	★	Introduction to Algebraic Conventions		0	0	17 / 17	18:55 13/9/2018

Using the various filtering options, you can quickly identify your areas of strength and those in need of further development.

Clicking on the column headers can also help you sort the data in a more convenient way. This can be used very effectively to quickly remind yourself of which topics you recently covered, as well as of those that you haven't tackled yet.

You can also get acknowledgement of your independent efforts by 'Acquiring' and 'Mastering' skills.

To Acquire a skill, simply watch fully its video and then successfully complete 2 Standard Interactive Questions and 2 Harder Interactive Questions.

A skill is Mastered by correctly answering all its Interactive Questions.

Please note that the "My Progress" page only records the activity undertaken independently. Results of questions attempted within your assignments are not included here.

Whether it is to improve your interactive questions score or just to refresh your memory on a topic, you will revisit videos and questions from time to time. To help you optimise your time and efforts, the system will remind you of which questions you have already successfully attempted in the past. This will be done with a green tick appearing on the question tab:



Here for instance, I can see that I have already managed to get 4 out of these 6 questions correct on a previous visit. I might now want to focus on the 2 remaining questions that I am yet to answer correctly or re-attempt them all if I wish.

Please be aware that your last attempt's score to a question will always prevail on what is kept on records.

FAQ

I've forgotten my password, can you email it to me please?

I'm afraid that for obvious safety reasons, we can't.

As mentioned earlier, please contact your teacher. They will be able to reset it for you.

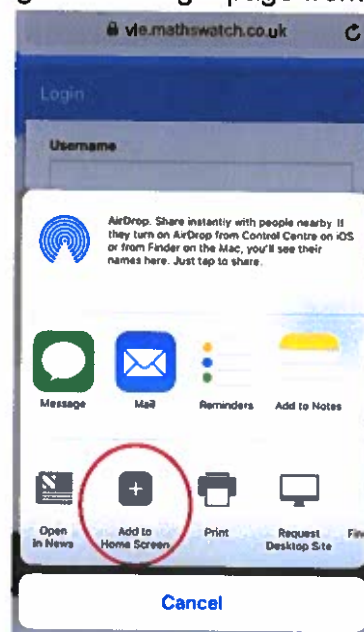
I entered the correct answer but the system is marking it wrong. What shall I do?

Take a screenshot of your answer and show it to your teacher. They will either find what is missing/wrong in it or contact us to have it fixed. It is unlikely that our marking is wrong but it does occasionally happen. Any requests received **from teachers** are usually analysed and corrected within the hour. Please note that we are unable to treat requests sent to us directly by students.

Is there an App I can download on my phone/tablet?

MathsWatch is a fully responsive platform, no need for an App to use it on any SMART device. Instead, just navigate to vle.mathswatch.com using your preferred browser and enter your user details just like you would on a PC/Laptop (most devices will offer to save your login details for next use). The website adapts to any screen size so it looks consistently good on mobiles, tablets and desktops.

For quick access, you can add a MathsWatch icon linking straight to the login page from your homescreen. Here is how to do it on iOS devices with Safari:



A similar option is available for Android devices.

Can I thank you for your brilliant resource, as it really helped me achieve my grade?

Of course you can. We do welcome and love unsolicited testimonials like yours.

Who knows? With a bit of luck, your comment might even appear on our website or on our next flyer.

Exceeding

NUMBER	N28a..... Long Multiplication - Integers	84A
	N28b..... Long Multiplication - Decimals	84B, 84C
	N29a..... Long Division - Integers	85A
	N29b..... Long Division - Decimals	85B, 85C
	N30a..... Prime Numbers - Introduction	86
	N30b..... Prime Numbers - Factorisation	86
	N31a..... HCF and LCM - Highest Common Factor	87
	N31b..... HCF and LCM - Lowest Common Multiple	87
	N32..... Decimals, Fractions and Percentages	88
	N33..... Fraction of an Amount	89A, 89B
	N34..... Ordering Fractions	90A, 90B
	N35..... Improper Fractions, Mixed Numbers	91
	N36..... Fractions - Adding and Subtracting	92
	N37a..... Fractions - Multiplying an Integer	93
	N37b..... Fractions - Dividing an Integer	93
	N38..... Rounding - Significant Figures	94
	N39a..... Percentages - Change to a Percentage	95A
	N39b..... Percentages - Comparing Quantities	95B
ALGEBRA	A16..... Trial and Improvement	96
	A17..... Forming and Solving Basic Equations	97
	A18..... Expanding Brackets - Harder Questions	98
	A19a..... Solving Harder Equations - Brackets and Fractions	99
	A19b..... Solving Harder Equations - x on Both Sides	99
	A20a..... Inequalities - Introduction	100A
	A20b..... Inequalities - Solving	100B
	A21a..... Real-Life Graphs - Distance-Time	101A
	A21b..... Real-Life Graphs - Other Types	101B
	A22..... Special Sequences	102
	A23a..... Quadratic Sequences - Finding the nth Term	103
	A23b..... Quadratic Sequences - Generating	103
	A24a..... Simultaneous Equations - Graphically	104
	A24b..... Simultaneous Equations - Algebraically	104
RATIO	R9a..... Increase/Decrease by a Percentage - Basics	105A
	R9b..... Increase/Decrease by a Percentage - Multiplier	105B
	R10..... Scale Factors - Similar Shapes	106
GEOMETRY	G23..... Angles in a Triangle - Proof	107
	G24..... Area - Composite Shapes	108A, 108B, 108C
	G25a..... Prisms - Volume	109A
	G25b..... Prisms - Surface Area	109B
	G26a..... Constructions - Bisecting a Line	110A
	G26b..... Constructions - Perpendiculars	110B
	G26c..... Constructions - Bisecting an Angle	110C
	G27..... Loci	111
	G28..... Enlargement	112A, 112B
	G29..... Bounds	113
	G30..... Pythagoras	114A, 114B, 114C
PROBABILITY	P5..... Two-Way Tables - Probabilities	115
	P6..... Venn Diagrams	116
STATISTICS	S8..... Scatter Diagrams	117
	S9..... Pie Charts	118

$$1) \quad 17 \times 32 = \underline{\quad}$$

$$2) \quad 24 \times 62 = \underline{\quad}$$

$$3) \quad 13 \times 156 = \underline{\quad}$$

$$4) \quad 528 \times 16 = \underline{\quad}$$

$$5) \quad 34 \times 466 = \underline{\quad}$$

1) $1.5 \times 22 = \underline{\hspace{2cm}}$

2) $7.6 \times 2.1 = \underline{\hspace{2cm}}$

3) $4.5 \times 9.99 = \underline{\hspace{2cm}}$

4) $19.7 \times 6.3 = \underline{\hspace{2cm}}$

5) $0.35 \times 0.12 = \underline{\hspace{2cm}}$

N28b

Long Multiplication Decimals

1) Work out what the * must be.

a)

$$\begin{array}{r}
 1 \ * \ 5 \\
 \ * \ 2 \quad \times \\
 \hline
 \ * \ 7 \ 0 \\
 1 \ 3 \ 5 \ 0 \\
 \hline
 \ * \ * \ * \ 0
 \end{array}$$

b)

$$\begin{array}{r}
 \times \quad \quad \ * \ * \quad \quad 3 \\
 80 \quad \boxed{\begin{array}{|c|c|} \hline 4800 & \ * \ * \ * \end{array}} \\
 \ * \quad \boxed{\begin{array}{|c|c|} \hline 120 & 6 \end{array}}
 \end{array}$$

answer: * * * *

c)

$$\begin{array}{r}
 4 \ * \\
 \ * \ 7 \quad \times \\
 \hline
 3 \ * \ 3 \\
 \ * \ 9 \ 0 \\
 \hline
 \ * \ * \ 3
 \end{array}$$

d)

$$\begin{array}{r}
 \times \quad \quad \ * \ 0 \quad \quad \ * \\
 \ * \ * \ * \quad \boxed{\begin{array}{|c|c|} \hline \ * \ * \ * \ * \ * & \ * \ * \ * \end{array}} \\
 40 \quad \boxed{\begin{array}{|c|c|} \hline \ * \ * \ 00 & \ * \ * \ * \end{array}} \\
 \ * \quad \boxed{\begin{array}{|c|c|} \hline 450 & 25 \end{array}}
 \end{array}$$

answer: 13775

2) A school organises a trip to a museum.

They set off in 13 minibuses, each minibus containing 24 pupils who will each pay to go into the museum.

Entrance to the museum costs £1.20 per person.

a) How many people made the trip?

b) What was the total cost?

$$1) \quad 288 \div 12 = \underline{\quad}$$

$$2) \quad 285 \div 15 = \underline{\quad}$$

$$3) \quad 425 \div 25 = \underline{\quad}$$

$$4) \quad 784 \div 56 = \underline{\quad}$$

$$5) \quad 874 \div 38 = \underline{\quad}$$

1) $79.2 \div 22 = \underline{\hspace{2cm}}$

2) $5.89 \div 19 = \underline{\hspace{2cm}}$

3) $9.87 \div 47 = \underline{\hspace{2cm}}$

4) $330.2 \div 13 = \underline{\hspace{2cm}}$

5) $42.624 \div 16 = \underline{\hspace{2cm}}$

- 1)
 - a) If 48 luxurious pens cost £768, how much would one of them cost?
 - b) If 25 tee shirts cost £77.50, how much would one of them cost?
 - c) If 53 mobile phones cost £2 119.47, how much would one of them cost?

- 2) Cans of juice cost 24p each.

Wendy has £8.65 to spend.

- a) What is the maximum number of cans Wendy can buy?
- b) How much change does she get?

- 3) Find the missing digits.

a)

$$\begin{array}{r} 3\Box \\ 14 \overline{) \Box 0 4} \end{array}$$

b)

$$\begin{array}{r} 2\Box \\ \Box 2 \overline{) 2 \Box 2} \end{array}$$

- 1) Write down the first 9 prime numbers.

- 2) Write down the first prime number that comes after 62.

- 3) Split up the following numbers into the product of their prime factors.
 - a) 12
 - b) 45
 - c) 72
 - d) 120
 - e) 550
 - f) 1296

- 4) Find the Highest Common Factor (HCF) of the following numbers.
 - a) 4 and 6
 - b) 8 and 16
 - c) 36 and 48
 - d) 300 and 525
 - e) 374 and 918
 - f) 45, 90 and 105

N31_{a/b}

Highest Common Factor
Lowest Common Multiple

- 1) Find the Highest Common Factor (HCF) of the following numbers.
 - a) 4 and 6
 - b) 8 and 16
 - c) 36 and 48
 - d) 300 and 525
 - e) 374 and 918
 - f) 45, 90 and 105

- 2) Find the Lowest Common Multiple (LCM) of the following numbers.
 - a) 8 and 12
 - b) 30 and 45
 - c) 15 and 18
 - d) 4, 6 and 8
 - e) 24 and 84
 - f) 72 and 96

- 3) The bells at Kings School ring every 6 minutes.
At Queens School the bells ring every 5 minutes.
At Princess School the bells ring every 9 minutes.
All three bells ring together at 8.30 am.
When is the next time the bells of the three schools will ring together?

1) Complete the tables.

a)

Fraction	Decimal	Percentage
		50%
	0.25	
$\frac{1}{10}$		
$\frac{1}{3}$		
	0.7	
		40%

b)

Fraction	Decimal	Percentage
$\frac{68}{100}$		
		35%
	0.6	
	$0.\dot{6}$	
		5%
$\frac{13}{50}$		

2) Put these fractions, decimals and percentages in order, smallest to largest.

a) $\frac{1}{2}$, 49%, $\frac{3}{5}$, 0.55

b) 27%, 0.2, $\frac{1}{4}$, $\frac{3}{10}$

c) $\frac{9}{10}$, 95%, 0.99, $\frac{97}{100}$

d) $\frac{1}{3}$, 0.6, $\frac{2}{3}$, 30%

e) 0.125, 10%, $\frac{11}{100}$, 0.09

3) Chris says that $\frac{3}{4}$ is halfway between 0.5 and 100%.

Is Chris correct? You must explain your answer.

4) Emily says that 0.2 is halfway between 10% and $\frac{3}{5}$.

Is Emily correct? You must explain your answer.

N33

Fraction of an Amount

1) Find the following:

a) $\frac{1}{3}$ of 24

b) $\frac{2}{3}$ of 24

c) $\frac{1}{5}$ of 30

d) $\frac{3}{5}$ of 30

e) $\frac{1}{8}$ of 40

f) $\frac{5}{8}$ of 40

2) Work out:

a) $\frac{7}{10}$ of £30

b) $\frac{3}{7}$ of £84

c) $\frac{4}{5}$ of £1.50

d) $\frac{11}{20}$ of £19

e) $\frac{2}{9}$ of £10.98

f) $\frac{8}{13}$ of £31.85

3) Julie has £4.50 pocket money every week.

If she spends $\frac{2}{5}$ of it on a magazine and $\frac{1}{3}$ of it on a dance lesson, how much of the pocket money does she have left?

4) Paul has £7.80 pocket money each week.

He always saves $\frac{1}{3}$ of it.

With the remaining money he spends $\frac{5}{8}$ on comics and the rest on sweets.

(i) How much does he save?

(ii) How much is spent on comics?

(iii) How much does he spend on sweets?

N33

Fraction of an Amount

- 1) a) Find $\frac{1}{2}$ of $\left(\frac{2}{3} \text{ of } 60\right)$
b) Find $\frac{3}{4}$ of $\left(\frac{1}{2} \text{ of } 80\right)$
c) Find $\frac{1}{2}$ of $\frac{4}{9}$ of $\frac{3}{4}$ of 42
- 2) a) If $\frac{3}{4}$ of a number is 60, what is the number?
b) If $\frac{3}{7}$ of a number is 21, what is the number?
c) If $\frac{4}{9}$ of a number is 12.3, what is the number?
- 3) If $\frac{1}{2}$ of $\frac{1}{5}$ of a number is 6, what is the number?
- 4) If $\frac{1}{2}$ of $\frac{1}{3}$ of $\frac{1}{4}$ of $\frac{1}{5}$ of a number is 2.5, what is the number?
- 5) If $\frac{3}{5}$ of $\frac{1}{2}$ of $\frac{2}{3}$ of a number is 3.8, what is the number?

N34

Ordering Fractions

- 1) Put the following fractions in order of size starting with the smallest.

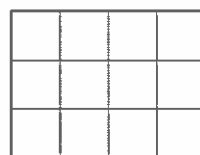
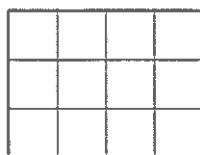
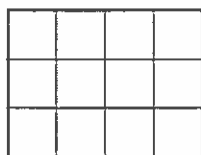
You can use the grids to help if you wish.

$$\frac{3}{4}$$

$$\frac{5}{6}$$

$$\frac{2}{3}$$

$$\frac{7}{12}$$



- 2) Put the following fractions in order of size starting with the smallest.

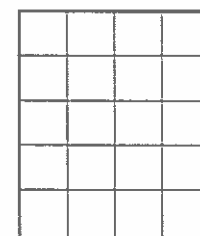
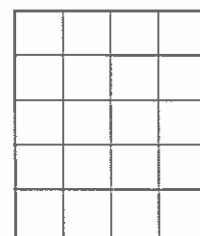
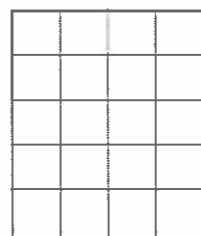
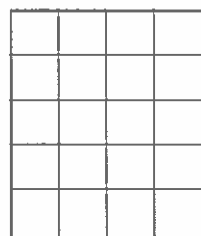
You can use the grids to help if you wish.

$$\frac{13}{20}$$

$$\frac{3}{5}$$

$$\frac{3}{4}$$

$$\frac{7}{10}$$



- 3) Put the following fractions in order of size starting with the smallest.

$$\frac{7}{12}$$

$$\frac{1}{2}$$

$$\frac{5}{8}$$

$$\frac{13}{24}$$

- 4) Put the following fractions in order of size starting with the smallest.

$$\frac{2}{5}$$

$$\frac{3}{10}$$

$$\frac{1}{3}$$

$$\frac{1}{6}$$

N34

Ordering Fractions

Place the fractions on the cards in order of size from smallest to largest.

Smallest

Largest

$$\frac{2}{3}$$

$$\frac{17}{30}$$

$$\frac{2}{5}$$

$$\frac{9}{20}$$

$$\frac{1}{2}$$

$$\frac{47}{60}$$

$$\frac{1}{3}$$

$$\frac{7}{15}$$

$$\frac{15}{24}$$

$$\frac{3}{4}$$

$$\frac{3}{8}$$

$$\frac{7}{12}$$

N35

Improper Fractions Mixed Numbers

1) Convert the following improper fractions to mixed numbers.

a) $\frac{5}{4}$

f) $\frac{25}{3}$

b) $\frac{8}{3}$

g) $\frac{30}{7}$

c) $\frac{12}{7}$

h) $\frac{75}{8}$

d) $\frac{20}{9}$

i) $\frac{47}{12}$

e) $\frac{16}{5}$

j) $\frac{100}{9}$

2) Convert the following mixed numbers to improper fractions.

a) $1\frac{3}{5}$

f) $10\frac{1}{9}$

b) $2\frac{1}{4}$

g) $7\frac{5}{8}$

c) $5\frac{2}{3}$

h) $9\frac{4}{5}$

d) $3\frac{3}{5}$

i) $6\frac{3}{11}$

e) $11\frac{2}{7}$

j) $12\frac{3}{4}$

3) Put these numbers in order, lowest to highest.

a) 3.5, $3\frac{1}{5}$, $\frac{11}{3}$

b) $7\frac{1}{4}$, 7.14, $\frac{34}{5}$

c) $1\frac{1}{10}$, 98%, $\frac{5}{4}$, 1

Fractions

N36 Adding and Subtracting

- 1) Work out the following, simplifying your answers where possible.

a) $\frac{2}{7} + \frac{3}{7} = \frac{\quad}{7}$

b) $\frac{3}{8} + \frac{1}{8} =$

c) $\frac{7}{9} - \frac{2}{9} = \frac{\quad}{9}$

d) $\frac{5}{10} - \frac{1}{10} =$

e) $\frac{1}{6} + \frac{2}{3} = \frac{\quad}{18} + \frac{\quad}{18} =$

f) $\frac{1}{6} + \frac{2}{3} = \frac{\quad}{6} + \frac{\quad}{6} =$

g) $\frac{4}{5} - \frac{1}{2} =$

h) $\frac{14}{15} - \frac{3}{5} = \frac{\quad}{15} - \frac{\quad}{15} =$

- 2) Work out the following, simplifying your answers where possible.

a) $\frac{3}{8} + \frac{4}{8} =$

b) $\frac{9}{11} - \frac{5}{11} =$

c) $\frac{1}{2} + \frac{1}{3} =$

d) $\frac{5}{7} - \frac{3}{5} =$

e) $\frac{1}{2} + \frac{2}{5} =$

f) $\frac{5}{6} - \frac{1}{4} =$

g) $\frac{5}{12} + \frac{1}{6} =$

h) $\frac{4}{5} - \frac{1}{10} =$

i) $\frac{3}{8} + \frac{1}{2} =$

j) $\frac{8}{9} - \frac{5}{6} =$

- 3) Write the missing numbers in each of these fraction sums.

a) $\frac{1}{3} + \frac{\quad}{6} = 1$

b) $\frac{3}{7} + \frac{12}{\quad} = 1$

c) $\frac{8}{5} - \frac{\quad}{15} = 1$

d) $\frac{15}{\quad} - \frac{1}{4} = 1$

N37_{a/b}

Fractions - Multiplying and Dividing an Integer

1) Work out the following, giving your answers in their simplest forms

a) $3 \times \frac{1}{4}$

e) $4 \times \frac{4}{9}$

b) $7 \times \frac{1}{7}$

f) $10 \times \frac{3}{8}$

c) $2 \times \frac{4}{5}$

g) $\frac{8}{9} \times 6$

d) $9 \times \frac{1}{3}$

h) $\frac{2}{15} \times 3$

2) Work out the following, giving your answers in their simplest forms

a) $\frac{1}{2}$ of £40

e) $\frac{2}{5}$ of 30 cm

b) $\frac{1}{5}$ of 20 km

f) $\frac{7}{8}$ of £16

c) $\frac{1}{4}$ of 120 kg

g) $\frac{4}{7}$ of 7000 g

d) $\frac{1}{9}$ of £99

h) $\frac{3}{4}$ of £500

3) Work out the following, giving your answers in their simplest forms

a) $3 \div \frac{1}{4}$

e) $10 \div \frac{2}{3}$

b) $7 \div \frac{1}{2}$

f) $8 \div \frac{4}{5}$

c) $12 \div \frac{1}{3}$

g) $3 \div \frac{5}{7}$

d) $9 \div \frac{1}{5}$

h) $15 \div \frac{2}{3}$

4) An industrial machine takes $\frac{3}{4}$ of an hour to produce a very special tool.
How long would it take the machine to produce 12 of the tools?

5) A road is 20 km long. Road signs are to be installed every $\frac{2}{3}$ of
a kilometre. How many signs will be needed?

1) Round the following to 1 significant figure.

- a) 478 cm
- b) 450 cm
- c) 449 cm
- d) 12761 m
- e) 28481 km

2) Round the following to 1 significant figure.

- a) 673.8 cm
- b) 4017.9 kg
- c) 246.83 m
- d) £45.38
- e) 20482.1 kg

3) Round the following to 1 significant figure.

- a) 0.26 ml
- b) 0.043 g
- c) 0.0671 m
- d) 0.000256 km
- e) 0.3822 m

4) Round the following to 1 significant figure.

- a) 962 m
- b) 0.923 cm
- c) 0.971 cm
- d) 0.096 km
- e) 0.00985 km

5) Round the following to 1 significant figure.

- a) £631428
- b) 0.00573 g
- c) £3614.68
- d) 0.493 ml
- e) £968

Percentages

N39a Change to a Percentage



1) Change the following to percentages:

- a) 83 out of 100
- b) 24 out of 50
- c) 9 out of 25
- d) 7 out of 20
- e) 6 out of 10
- f) 72 out of 200
- g) 12 out of 40
- h) 36 out of 60



2) Nas scores 24 out of 60 in a test.

What is his percentage score?



3) Change the following to percentages, giving your answers to 1 decimal place:

- a) 7 out of 24
- b) 35 out of 41
- c) 92 out of 143



4) Jamie scores 48 out of 70 in his Science test and 38 out of 52 in his Maths test.

He says, "I did better in Science because 48 is a higher score than 38."

Is he correct? Explain your answer.

N39b Percentages Comparing Quantities



- 1) A supermarket does a taste-test of cola.

40 people try cola A, 26 people like it.

50 people try cola B, 32 people like it.

Which cola was liked by the higher percentage of people?
You must show your working.



- 2) Leon does a spelling test and a times tables test.

He scores 7 out of 20 in the spelling test and 9 out of 25 in the times tables test.

In which test did he get the higher percentage score?
You must show your working.



- 3) In a survey carried out in the year 2000, 50 000 people were asked if they had a mobile phone. 26 000 did.

In a similar survey, carried out in the year 2014, 33 000 people were asked if they had a mobile phone. 22 000 did.

In which year did the higher percentage of people own a mobile phone?
You must show your working.

A16 Trial and Improvement

- 1) Using a trial and improvement method,
solve the equation $x^2 - x = 56$
You must show ALL your working.

- 2) Using a trial and improvement method,
solve the equation $x^2 + 4x = 21$
You must show ALL your working.

- 3) Using a trial and improvement method,
solve the equation $x^3 + 2x = 72$
You must show ALL your working.

- 4) Using a trial and improvement method,
solve the equation $x^3 - 3x = 110$
You must show ALL your working.

A17

Forming and Solving Basic equations

- 1) Using the statement: *"I think of a number, double it, and subtract 1. I get 7."*
 - a) Form an equation.
 - b) Solve the equation to find the number that was thought of.

- 2) Using the statement: *"I think of a number, multiply it by 7, and add 3. I get 80."*
 - a) Form an equation.
 - b) Solve the equation to find the number that was thought of.

- 3) Using the statement: *"I think of a number, multiply it by 2, divide the result by 3 and then subtract 5. I get 5."*
 - a) Form an equation.
 - b) Solve the equation to find the number that was thought of.

A18

Expanding Brackets Harder Questions

1) Expand and simplify

- a) $(x + 2)(x + 2)$
- b) $(x + 3)(x + 5)$
- c) $(x + 7)(x + 1)$
- d) $(x + 4)(x + 3)$
- e) $(x + 7)(x + 2)$

2) Expand and simplify

- a) $(2x + 1)(3x + 2)$
- b) $(4x + 3)(2x + 1)$
- c) $(3x + 4)(3x + 2)$
- d) $(5x + 2)(5x + 7)$
- e) $(2x + 10)(2x + 4)$

3) Expand and simplify

- a) $(x + 5)(x - 3)$
- b) $(x - 2)(x + 4)$
- c) $(x - 6)(x - 2)$
- d) $(x + 7)(x + 3)$
- e) $(x - 8)(x - 2)$

4) Expand and simplify

- a) $(2x - 1)(3x + 4)$
- b) $(5x - 2)(3x - 1)$
- c) $(3x + 4)(2x - 3)$
- d) $(5x - 1)(5x - 2)$
- e) $(4x + 2)(3x - 5)$

5) Expand and simplify

- a) $(x + 5)^2$
- b) $(x - 2)^2$
- c) $(2x + 3)^2$
- d) $(3x - 1)^2$
- e) $(4x + 3)^2$

Solving Harder Equations

A19_{a/b}

1) Solve the following

- a) $2x + 3 = 19$
- b) $3x - 2 = 13$
- c) $5x - 1 = 9$
- d) $3 + 2x = 23$
- e) $12 - 3x = 9$

2) Solve the following

- a) $2(3x - 1) = 22$
- b) $3(x + 7) = 18$
- c) $4(5x - 2) = 12$
- d) $66 = 6(2x + 3)$
- e) $20 = 5(x - 6)$

3) Solve the following

- a) $\frac{x-6}{2} = 3$
- b) $\frac{x+8}{3} = 5$
- c) $\frac{2x-1}{3} = 5$
- d) $\frac{6x+1}{2} = 8$
- e) $\frac{7x-3}{5} = 5$

4) Solve the following

- a) $2x + 7 = x + 12$
- b) $4x - 5 = 2x + 3$
- c) $7x + 2 = 3x + 26$
- d) $6x - 7 = 4x - 5$
- e) $3x + 4 = x - 7$

5) Solve the following

- a) $x - 6 = 2x - 13$
- b) $3x + 4 = 5x - 8$
- c) $4x + 17 = x - 4$
- d) $5 - 2x = x - 7$
- e) $2x - 1 = 14 - 3x$

6) Solve the following

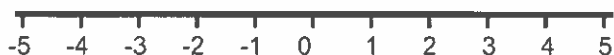
- a) $2(3x - 1) = 4x + 7$
- b) $3(x + 4) = 2(x - 5)$
- c) $5(2x - 3) = 3(3x + 4)$
- d) $2(2x - 1) = 5(2x - 4)$
- e) $2(2x + 3) = 5(x + 3)$

7) Solve the following

- a) $\frac{2(x+1)}{3} = 6$
- b) $\frac{4(2x-3)}{5} = 4$
- c) $\frac{2(4x-5)}{3} = x + 10$
- d) $\frac{3(5x+4)}{2} = 7x - 8$
- e) $4 - x = \frac{2(x+7)}{3}$

1) Represent the inequalities on the number lines.

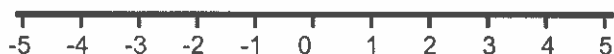
a) $x \leq 3$



b) $-1 < x \leq 4$

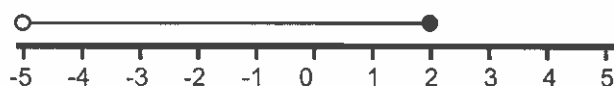


c) $-3 \leq x \leq 3$



2) Write down the inequalities shown below

a)



b)



c)



3) If x is an integer, what are the possible values of x ?

a) $-4 \leq x \leq 2$

b) $-3 \leq x < 1$

c) $1 < x \leq 5$

d) $-3 < x \leq 4$

e) $-7 \leq x \leq -4$

A20b

Inequalities Solving

1) Solve

- a) $2x - 1 \geq 7$
- b) $3x + 4 < 19$
- c) $5x - 7 \leq 18$
- d) $2x + 9 > 5$
- e) $4x + 11 \leq 14$

2) Solve

- a) $\frac{x}{3} < 7$
- b) $\frac{x}{5} - 1 \geq 3$
- c) $\frac{2x}{3} + 4 \leq 9$
- d) $12 \geq 2x - 1$
- e) $20 < 5 + 5x$

3) Solve

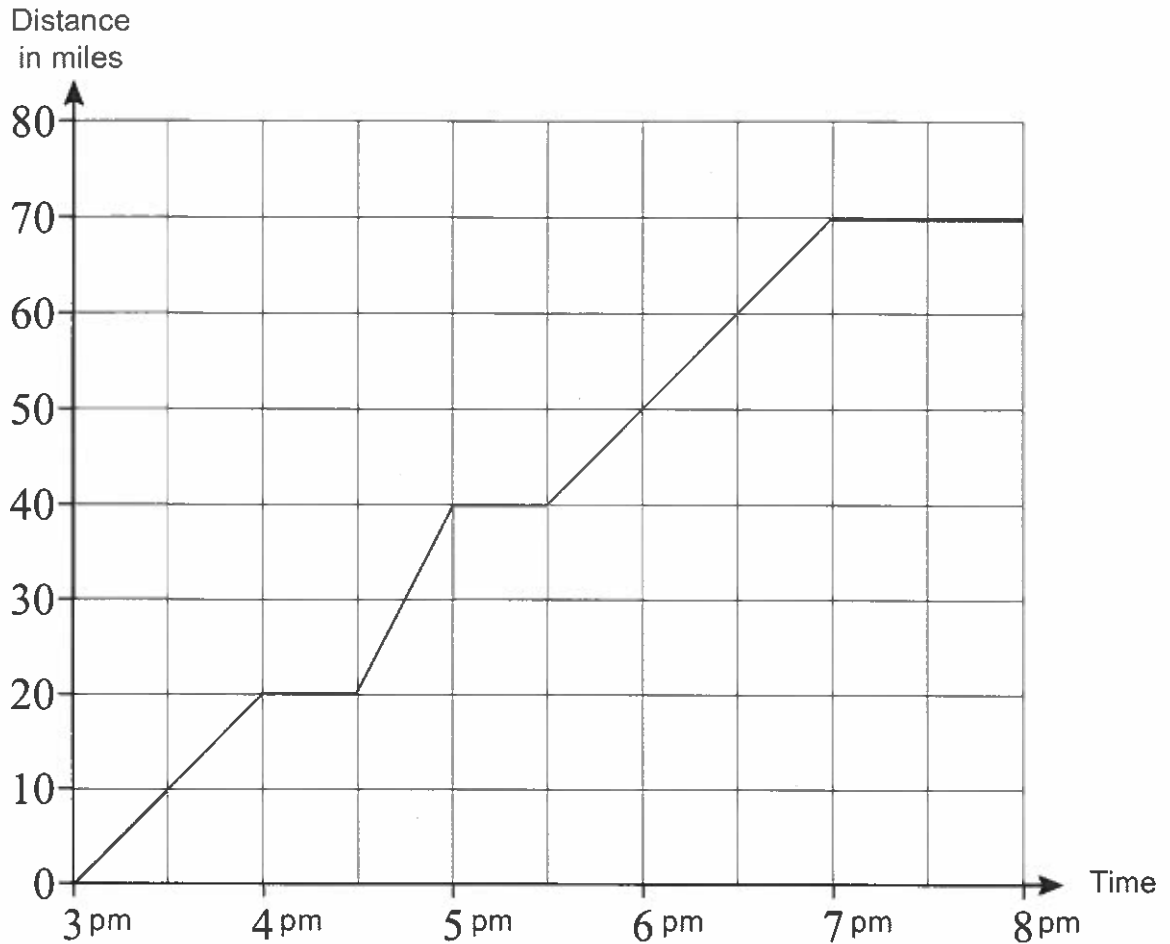
- a) $2(5x - 1) \leq 18$
- b) $3(4x + 2) > 60$
- c) $42 > 2(6x + 15)$
- d) $4(1 + x) \leq 12$
- e) $8(2x - 1) > 12$

4) Solve

- a) $2x + 7 \leq x + 9$
- b) $x - 6 > 3x - 18$
- c) $4x + 3 < 2x - 9$
- d) $2x - 4 \geq 7x - 34$
- e) $2(x + 3) < x - 1$

A21a

Real-Life Graphs Distance-Time



The graph, above, shows Jade's journey by scooter from her house to university with some stops along the way.

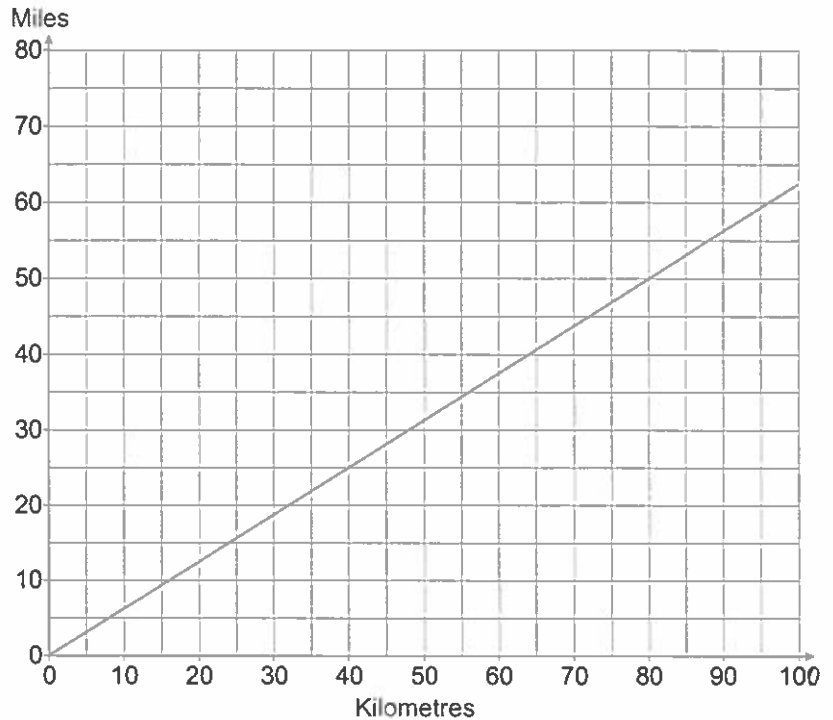
- How long did the journey take?
- How many breaks did Jade take throughout her journey?
- At what time did Jade take her first break?
- How long did the first break last?
- What was Jade's average speed between 3 pm and 4 pm?
- What was Jade's average speed between 4.30 pm and 5 pm?
- What was Jade's average speed between 5.30 pm and 7 pm?

A21b

Real-Life Graphs Other Types

1) Use the conversion graph below to convert :

- 80 km to miles
- 35 miles to km
- 40 km to miles
- 60 miles to km
- 100 miles to km
- 140 km to miles



2) The graph below shows three different mobile phone tariffs.

Tariff 1

Pay as you go
50p per minute.

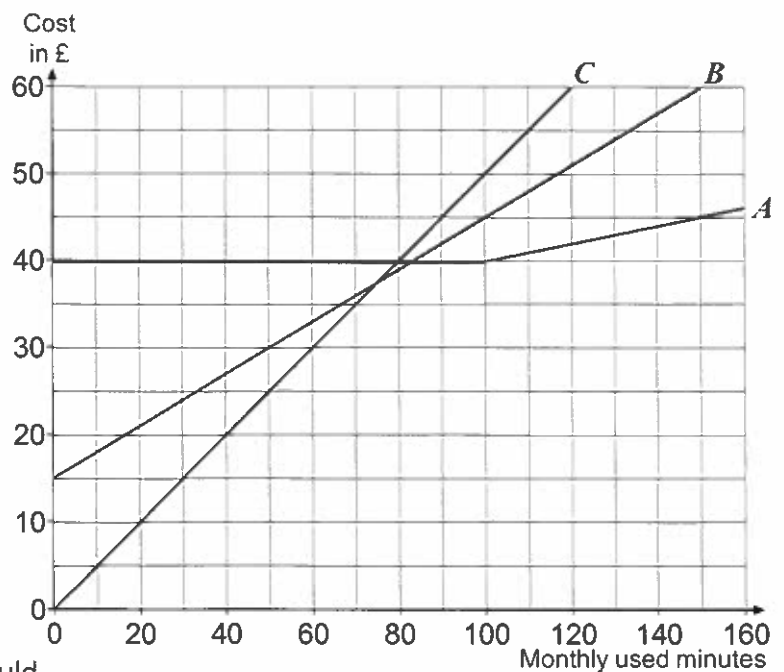
Tariff 2

£15 per month and
30p per minute

Tariff 3

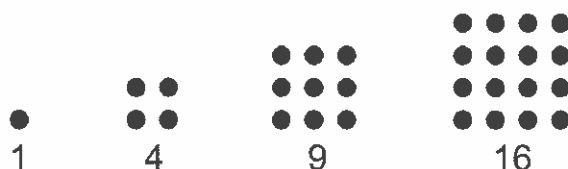
£40 per month,
100 free minutes then
10p per minute

- Match each tariff with its graph, A, B or C
- Every month, James needs about 90 mins talk time. Work out which tariff would be best for him. Explain your answer.



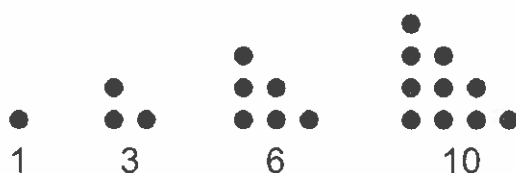
- Tariff 4 is announced. This is £10 per month, 40 free minutes then 30p per minute. Draw a line on the graph to show this tariff.

- 1) Here is a pattern of square numbers:



What are the next two numbers in the pattern?

- 2) Here is the pattern of triangular numbers:



What are the next three numbers in the pattern?

- 3) Here is part of a Fibonacci sequence:

5, 8, 13, 21, 34

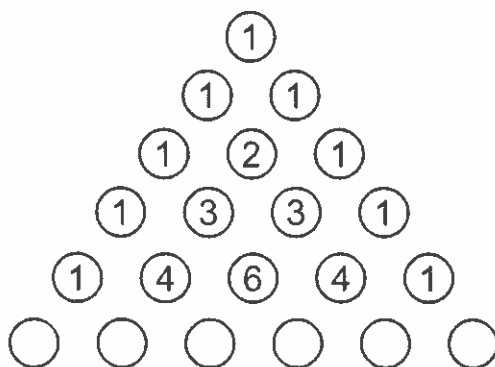
What are the next three numbers in the sequence?

- 4) Here is part of a number pattern:

3, 4, 6, 9, 13

What are the next three numbers in the pattern?

- 5) Can you work out a rule and fill in the bottom row?



A23_{a/b} Quadratic Sequences

- 1) Find the n th term of
 - a) 1, 4, 9, 16, 25,
 - b) 2, 5, 10, 17, 26,
 - c) 0, 3, 8, 15, 24,
- 2) Find the n th term of
 - a) 1, 4, 9, 16, 25,
 - b) 2, 8, 18, 32, 50,
 - c) 0.5, 2, 4.5, 8, 12.5,
- 3) Find the n th term of
 - a) 3, 9, 19, 33, 51,
 - b) 1, 7, 17, 31, 49,
 - c) 11, 41, 91, 161, 251,
- 4) For the following n th terms,
find the first three terms and the tenth term
 - a) $n^2 + 4$
 - b) $n^2 - 3$
 - c) $n^2 + 10$
 - d) $n^2 + 2n$
 - e) $n^2 - n$
- 5) For the following n th terms,
find the first three terms and the tenth term
 - a) $4n^2$
 - b) $2n^2 + 3n$
 - c) $3n^2 - 2n$
 - d) $n^2 + n + 1$
 - e) $2n^2 + 4n - 3$

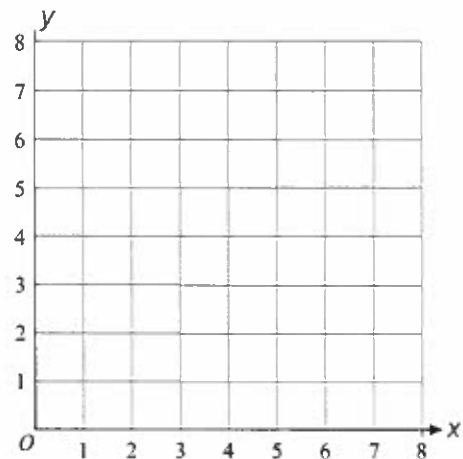
Simultaneous Equations

A24_{a/b}

- 1) a) Complete the table of values for $y = x + 2$
 b) Draw the graph of $y = x + 2$
 c) Complete the table of values for $x + y = 7$
 d) Draw the graph of $x + y = 7$
 e) Use your graph to solve the simultaneous equations $y = x + 2$ and $x + y = 7$

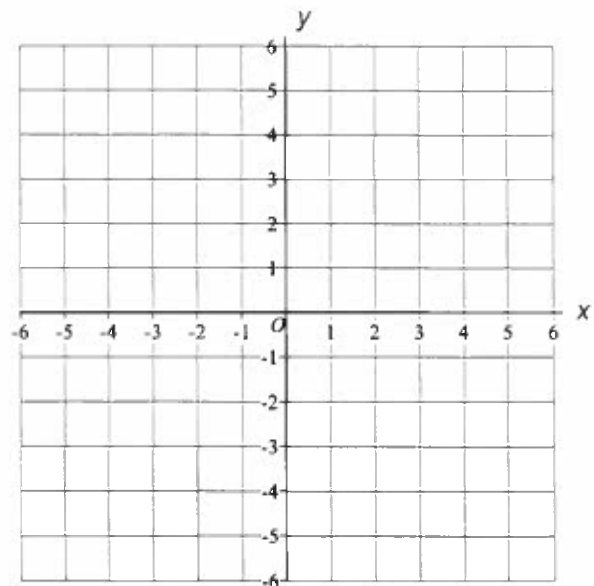
x	0	1	2	3	4
y					

x	0	1	2	3	4
y					



- 2) Using a graphical method, solve the simultaneous equations

$$y = 2x - 3 \text{ and } y = 6 - x$$



- 3) Solve the simultaneous equations $y = x + 6$ and $y = 3 - x$
 4) Solve the simultaneous equations $y = x - 14$ and $y = 2 - 3x$

Increase/Decrease by a Percentage - Basics

R9a

- 1) Describe how you would increase a number by 10%.

- 2) Describe how you would decrease a number by 10%.

- 3) Increase the following numbers by 10%

a) 40	e) 75
b) 140	f) 505
c) 810	g) 12
d) 320	h) 123

- 4) Decrease the following numbers by 10%

a) 20	e) 25
b) 160	f) 445
c) 80	g) 13
d) 190	h) 7

- 5) Work out the following:

a) Increase £400 by 5%	e) Increase 250 m by 50%
b) Decrease £120 by 15%	f) Decrease £820 by 75%
c) Decrease 500 km by 20%	g) Increase 60 kg by 60%
d) Increase 96 kg by 10%	h) Decrease £26 by 35%

- 6) A shop is having a sale and all prices are reduced by 25%.
 - a) Work out the sale price of an item normally priced at £18.40
 - b) Work out the sale price of an item normally priced at £99

Increase/Decrease R9b by a Percentage - Multiplier

- 1)
 - a) Increase £400 by 16%
 - b) Increase £750 by 24%
 - c) Increase £2000 by 38%
 - d) Increase £14500 by 19%
 - e) Increase £16.50 by 30%

- 2)
 - a) Decrease £700 by 32%
 - b) Decrease £36 by 14%
 - c) Decrease £1970 by 40%
 - d) Decrease £3000 by 12.5%
 - e) Decrease £3124 by 16.25%

- 3) A sports shop reduces the price of all its trainers by 15% in the Spring sale.
Before the sale, one pair of trainers cost £74.
How much are they after the reduction?

- 4) Tim took up weightlifting.
In his first session he could bench-press 45 kg.
Four weeks later he could bench-press 22% more.
How much could he now lift to the nearest kg?

- 5) If a manager of a shop reduces the price of a £1500 piano by 15% and then, four weeks later, increases the reduced price by 15%, how much does it now cost?

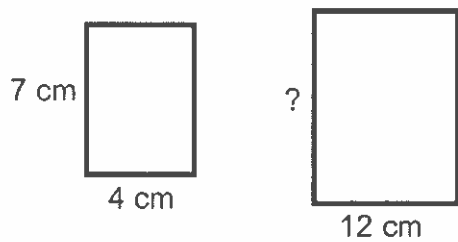
R10

Scale Factors Similar Shapes

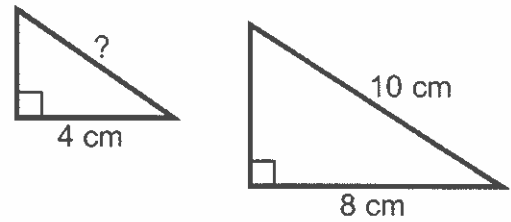
- 1) In each of the following questions, the two shapes are mathematically similar.

Work out the lengths of the missing sides.

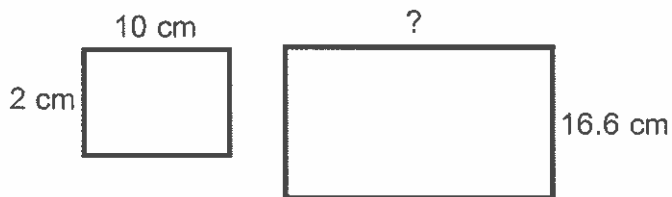
a)



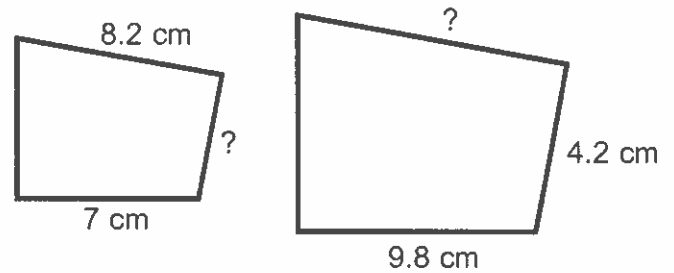
b)



c)

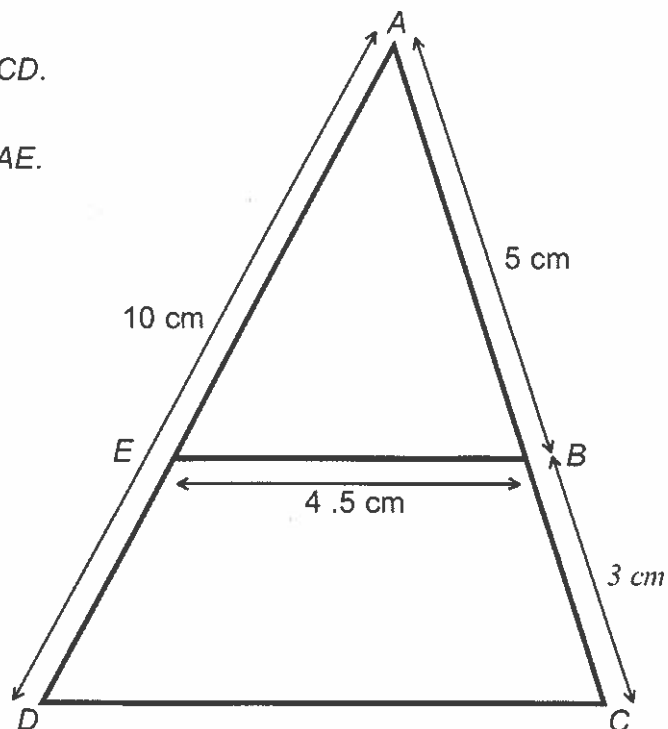


d)

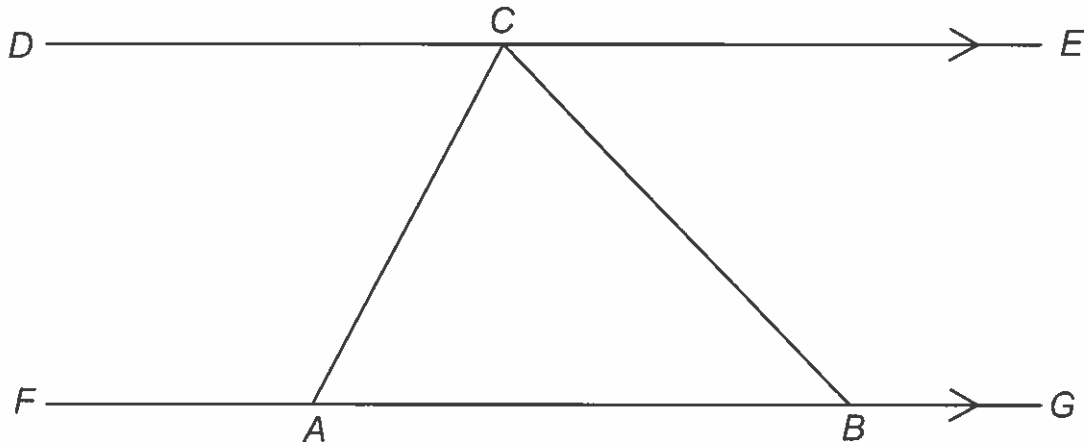


- 2) a) Work out the length of CD .

- b) Work out the length of AE .



Fill in the missing parts:



Angle DCA is equal to angle CAB because they are _____

Angle ECB is equal to angle CBA because they are _____

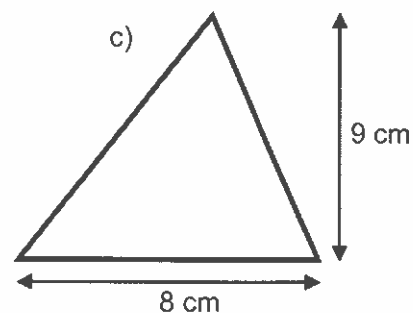
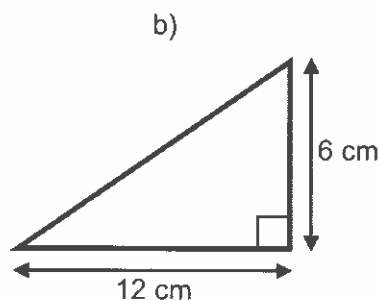
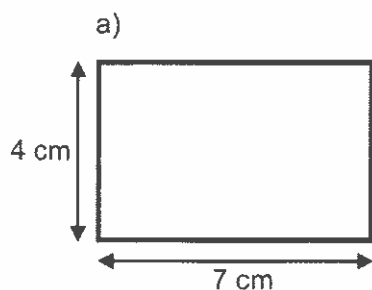
Angle _____ is in triangle ABC and on straight line DCE .

Angles DCA , ACB , and ECB lie on a straight line so they must add up to _____°

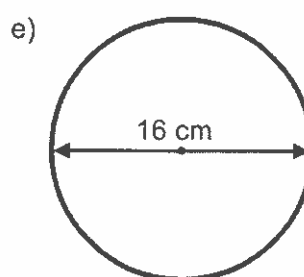
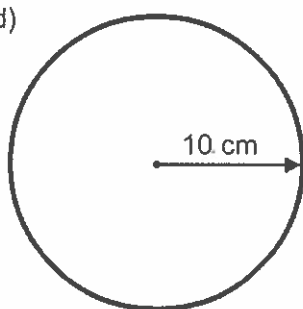
Therefore, angles CAB , CBA , and ACB must also add up to _____°

The angles in a _____ add up to _____°

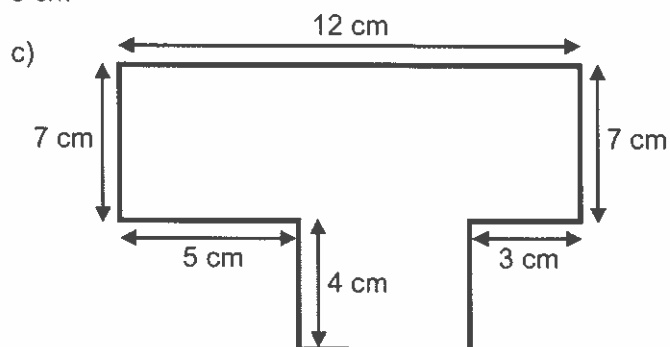
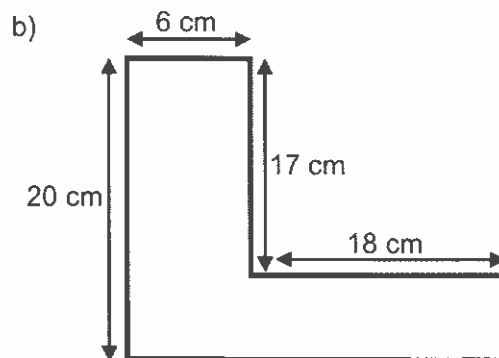
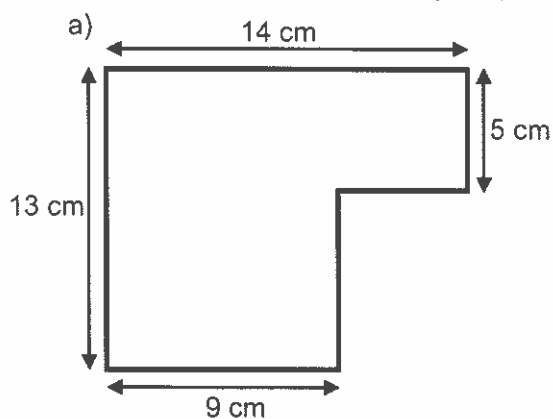
1) Find the areas of the following shapes:



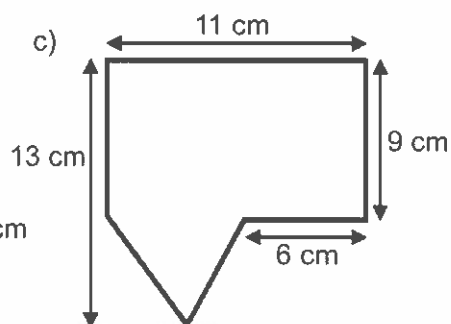
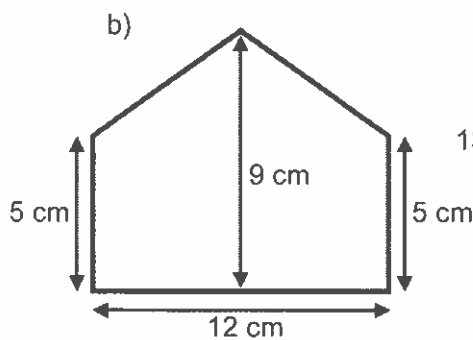
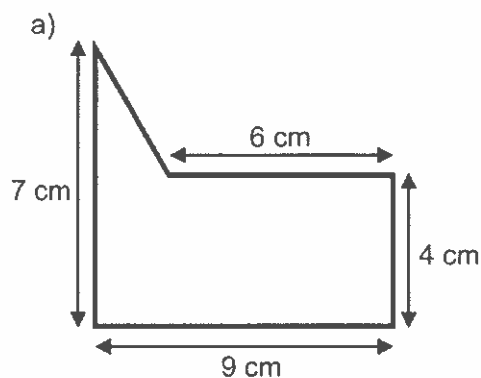
d) Take π to be 3.142



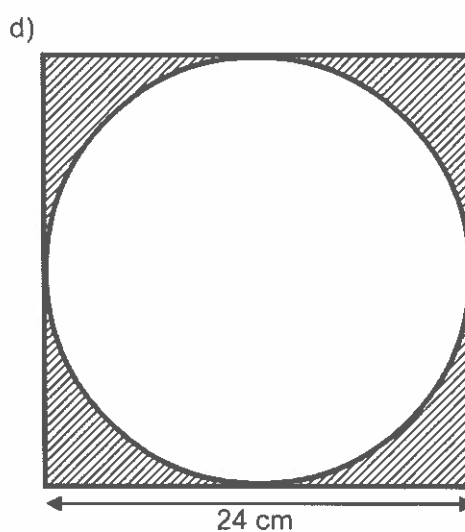
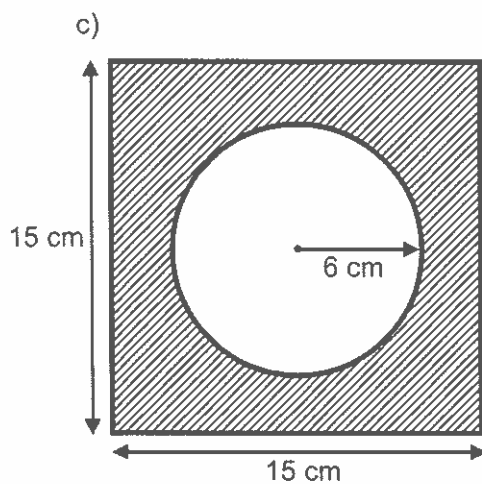
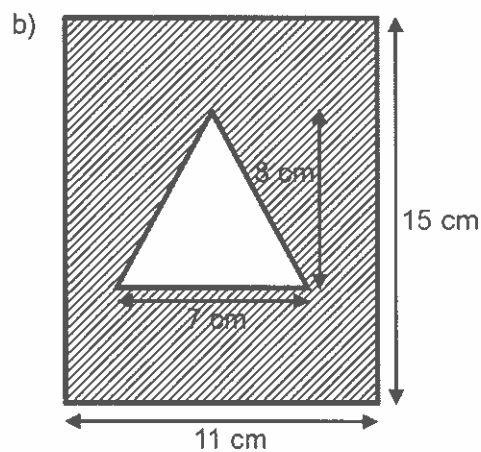
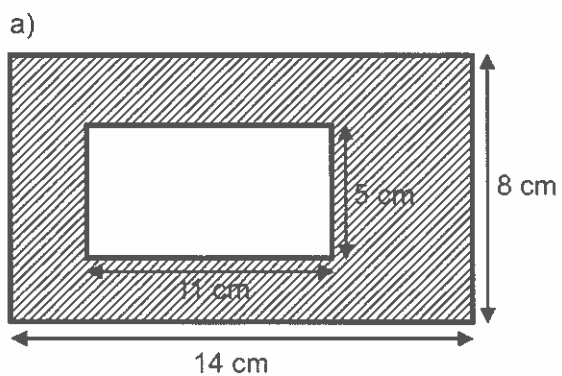
2) Find the areas of the following shapes:



1) Find the areas of the following shapes:

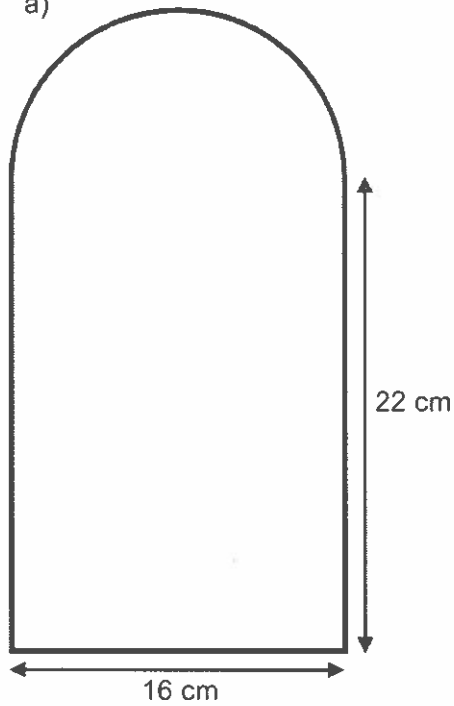


2) Find the areas of the shaded parts of the following:
Take π to be 3.142 when needed.

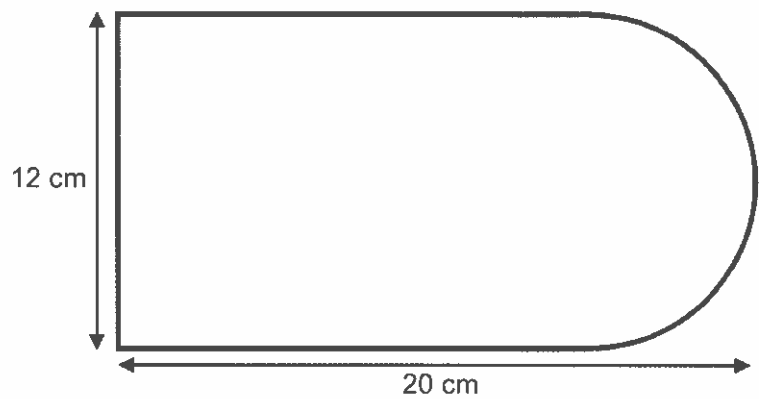


Find the areas of the shapes below:
Take π to be 3.142

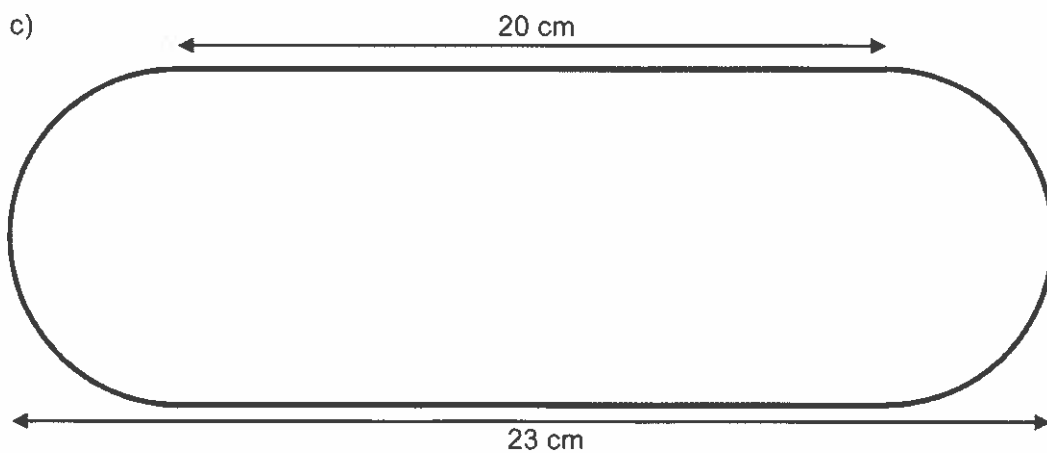
a)



b)



c)

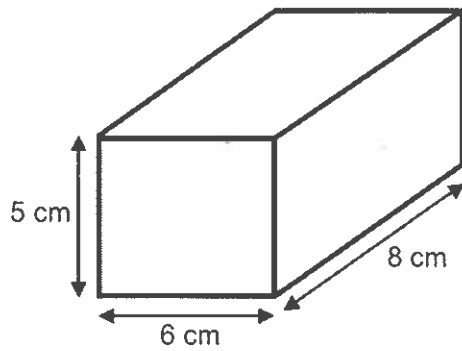


G25a

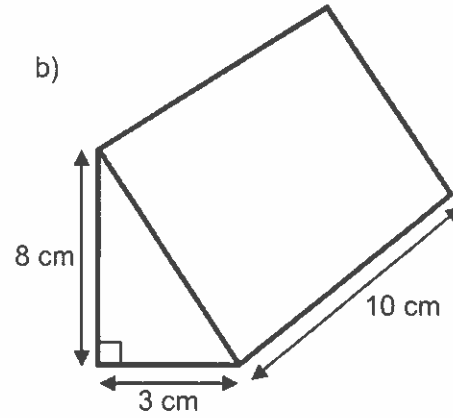
Prisms Volume

Find the volumes of the prisms, below.
Take π to be 3.142 for questions c and d.

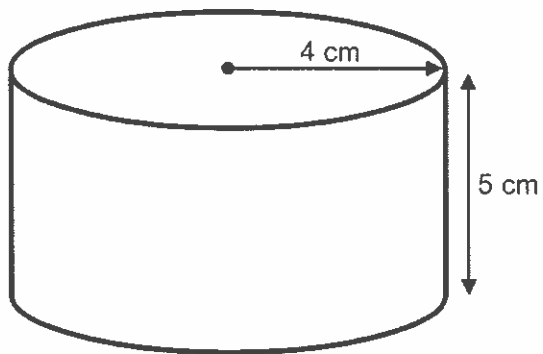
a)



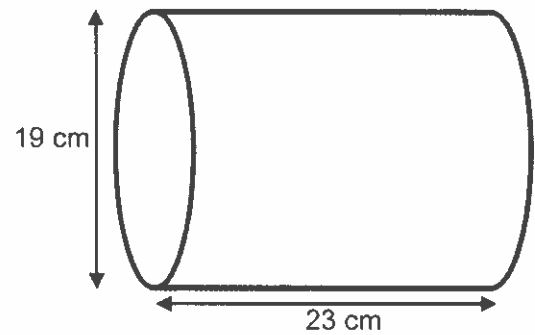
b)



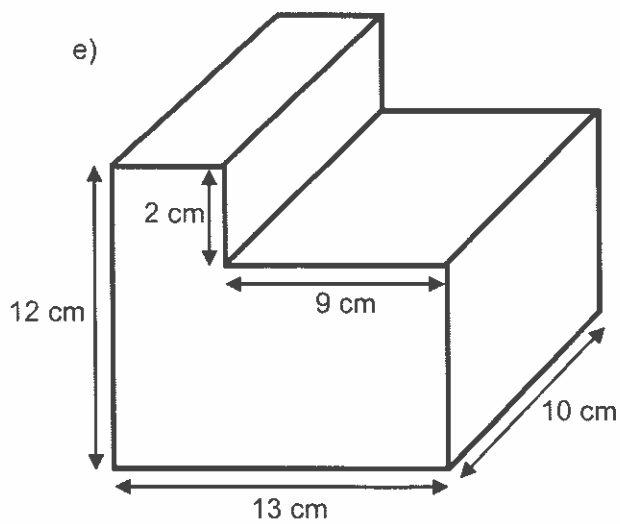
c)



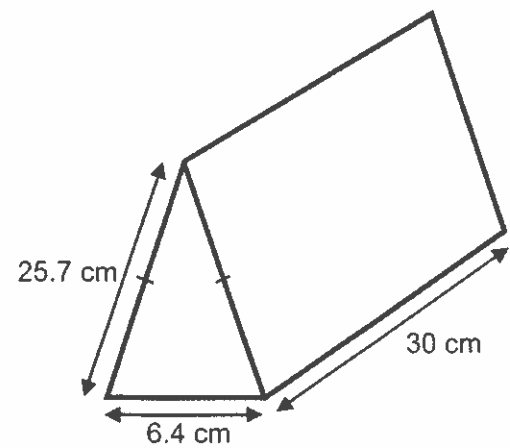
d)



e)



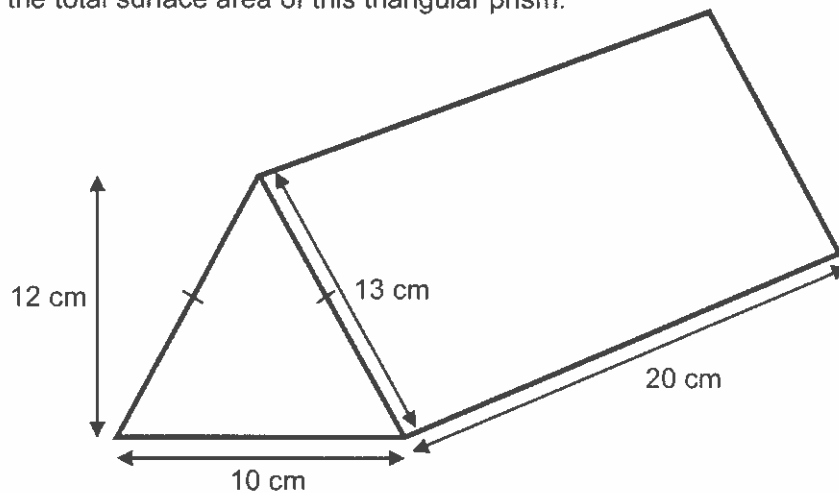
f)



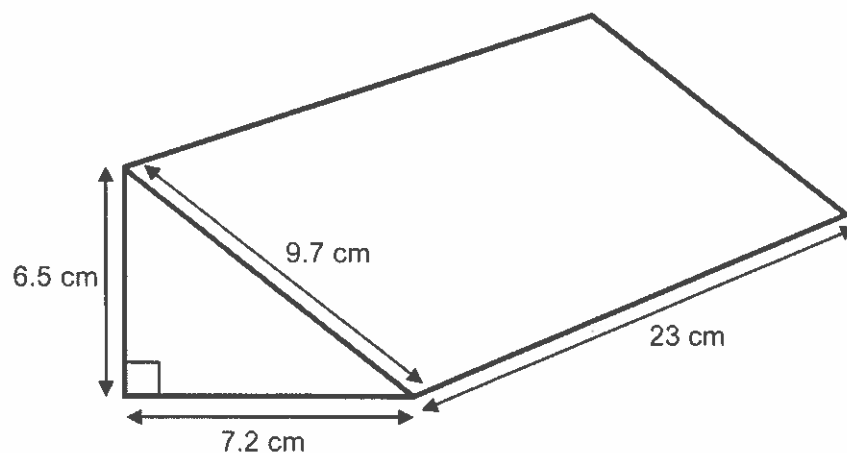
G25b

Prisms Surface Area

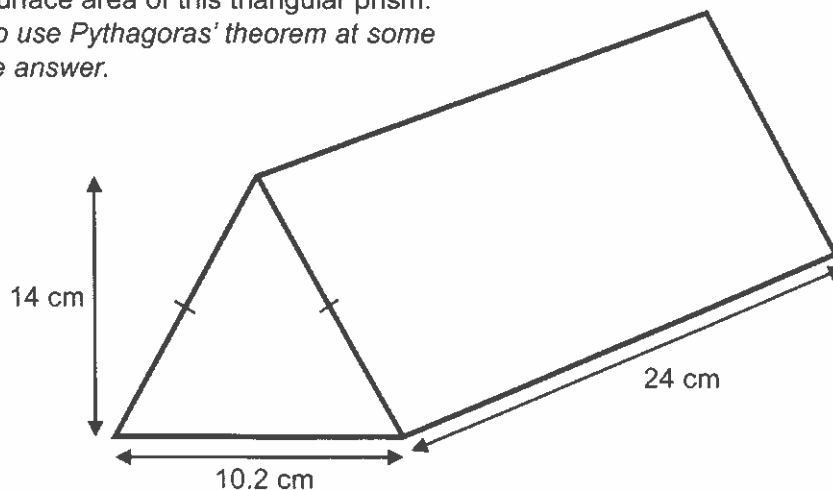
- 1) Find the total surface area of this triangular prism.



- 2) Find the total surface area of this triangular prism.



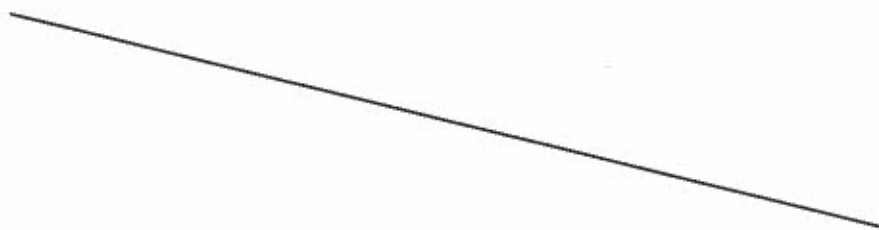
- 3) Find the total surface area of this triangular prism.
You will need to use Pythagoras' theorem at some stage to get the answer.



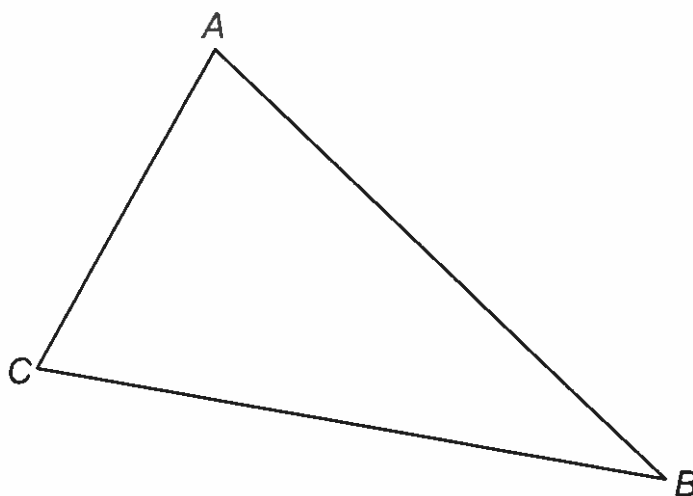
G26a

Constructions Bisecting a Line

- 1) Use compasses and a ruler to bisect this line.



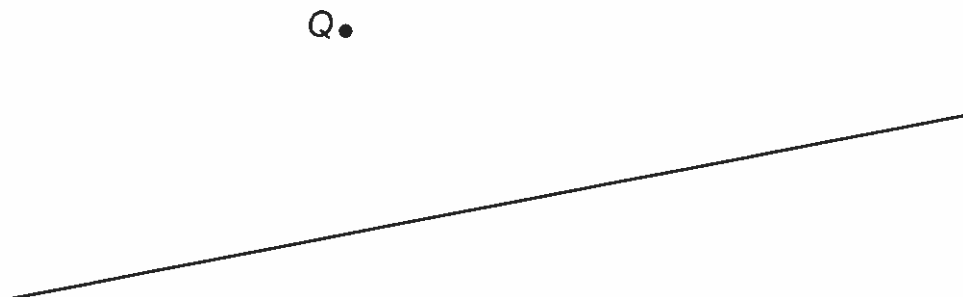
- 2) Using compasses and a ruler
- Bisect lines AB , BC and AC .
 - Place your compass point where your three lines cross and open them out until your pencil is touching A . Draw a circle.



- 1) Using compasses and a ruler, construct a perpendicular to the line at the point P .



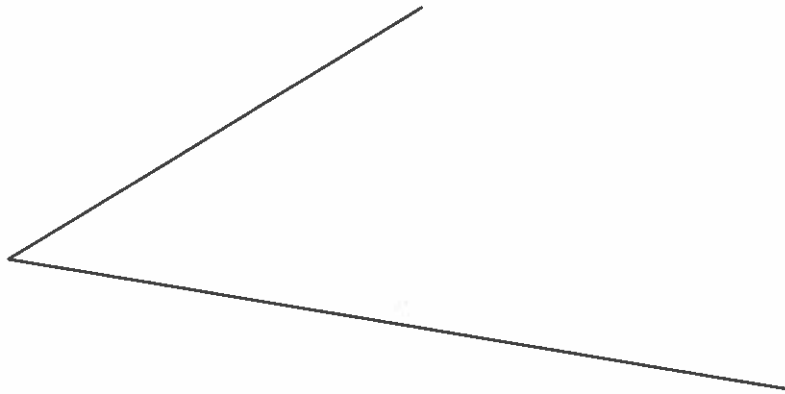
- 2) Using compasses and a ruler, construct a perpendicular to the line from the point Q .



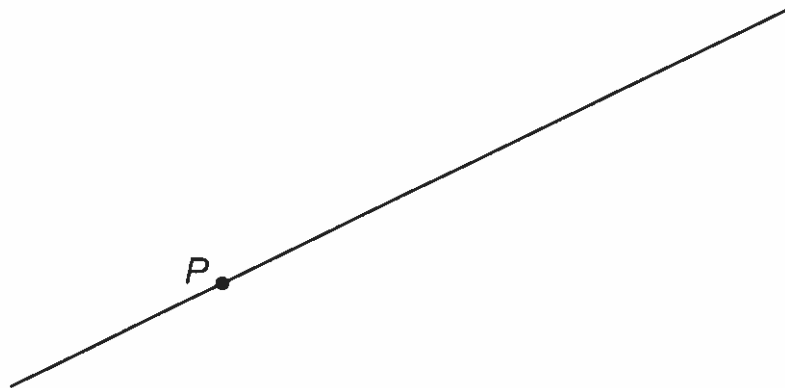
Constructions

G26c Bisecting an Angle

- 1) Using compasses and a ruler, bisect this angle.



- 2) Using compasses and a ruler,
a) Construct a perpendicular to the line at the point P .



- b) Bisect the angle where your perpendicular meets line AB .
c) What size is the angle you have just constructed?

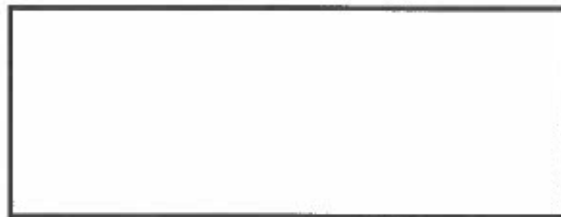
G27

Loci

- 1) Draw the locus of all the points that are 1.2 cm away from the line AB .



- 2) Draw the locus of all the points that are 1.5 cm away from the rectangle $ABCD$.

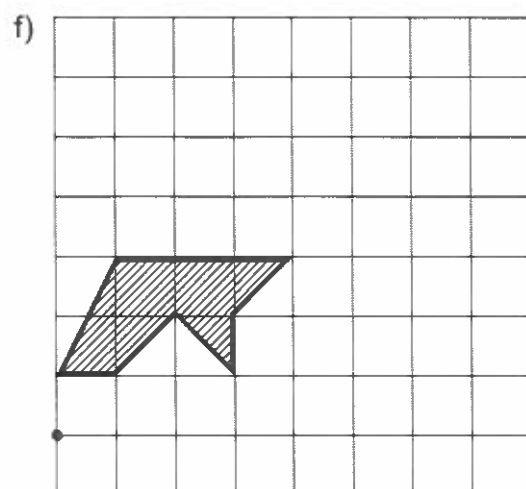
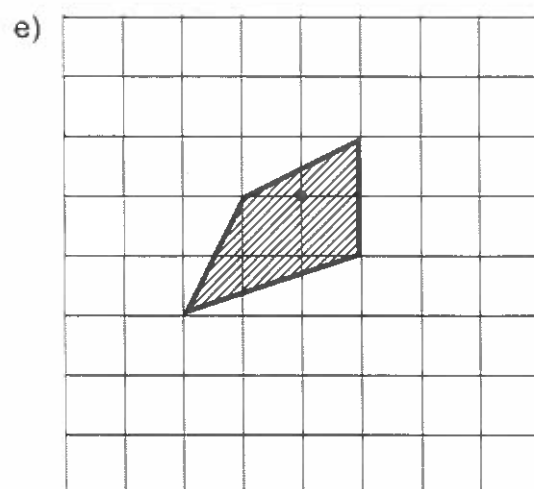
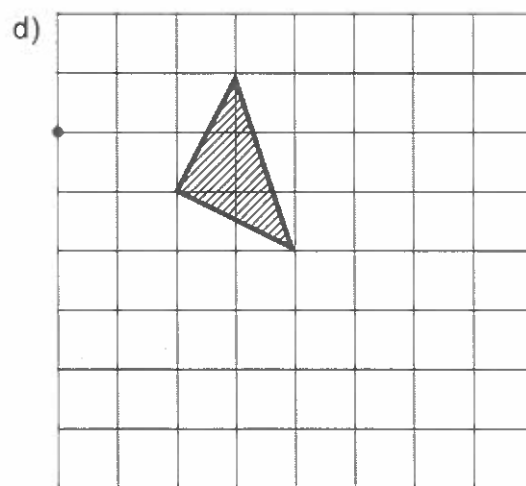
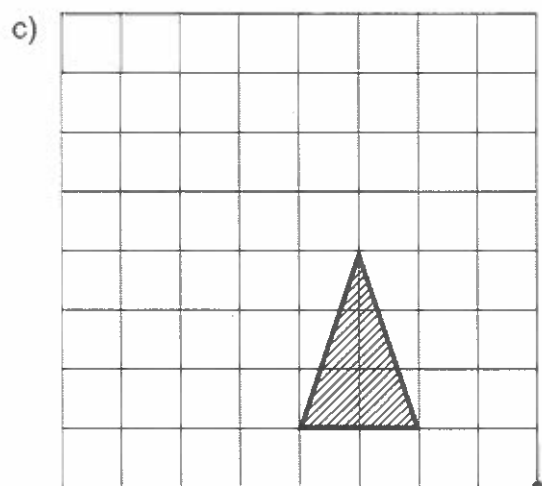
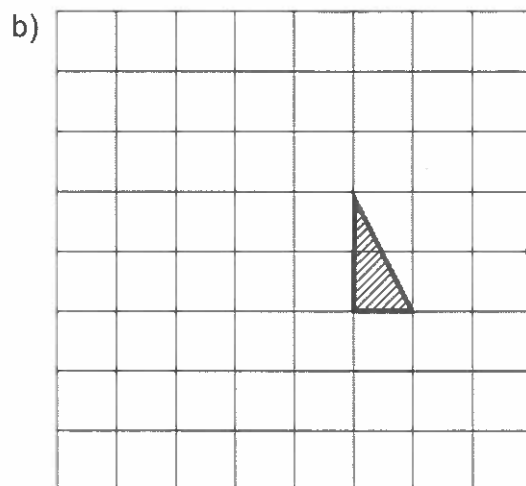
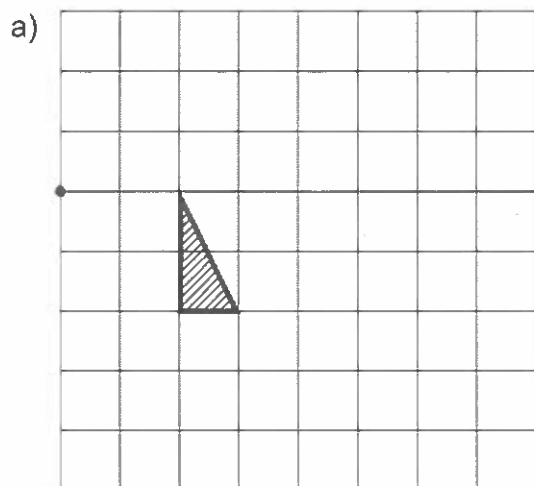


- 3) Radio signals can be heard within a 4.5 km radius of transmitter A and a 5.5 km radius of transmitter B . Show, by shading, the area where radio signals can be heard from both transmitters at the same time. Use a scale of 1 cm represents 1 km.



G28 Enlargement

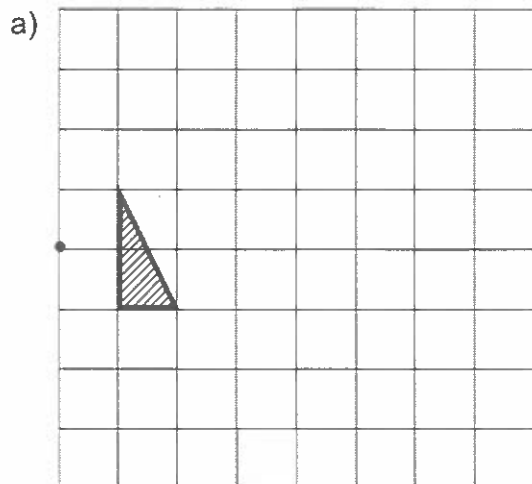
Enlarge the following shapes with scale factor 2, using the dot as the centre of enlargement.



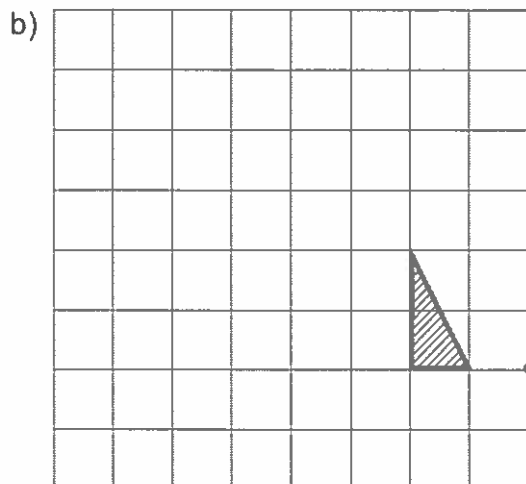
G28 Enlargement

- 1) Enlarge the following shapes using the dots as the centres of enlargement.

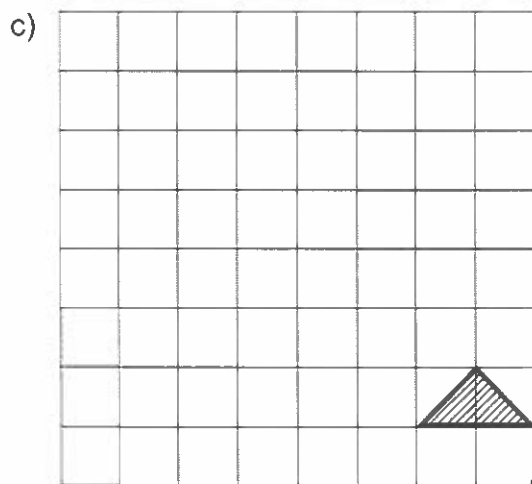
Scale factor 3



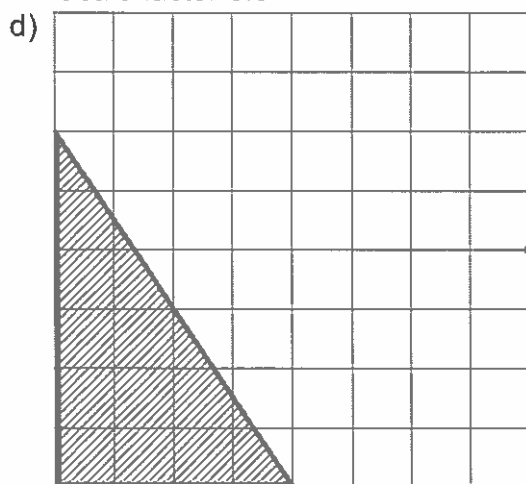
Scale factor 3



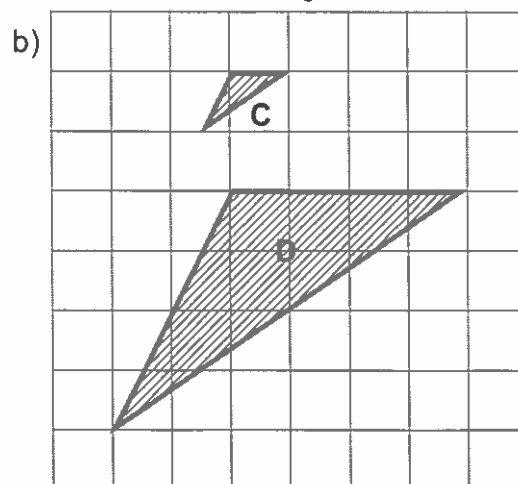
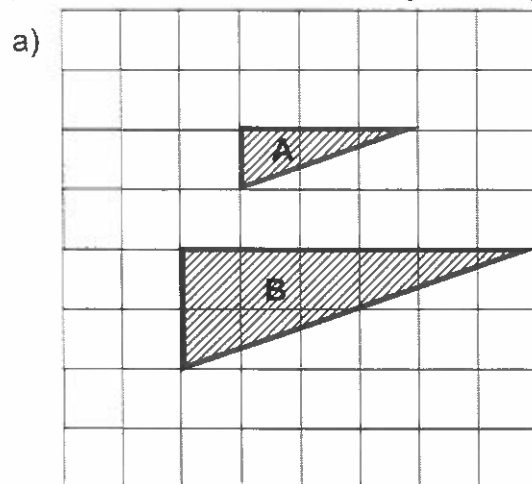
Scale factor 4



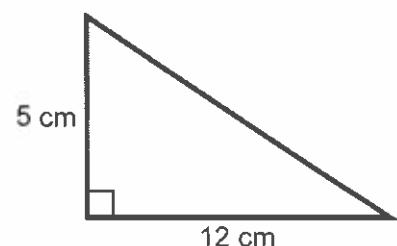
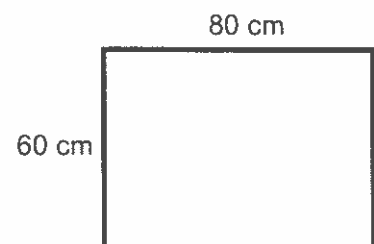
Scale factor 0.5



- 2) Use dots to mark on the grids the positions of the centres of enlargement.

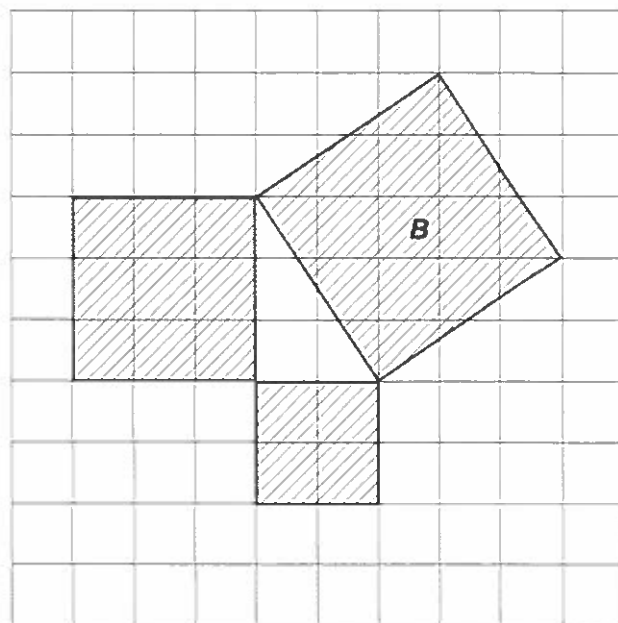
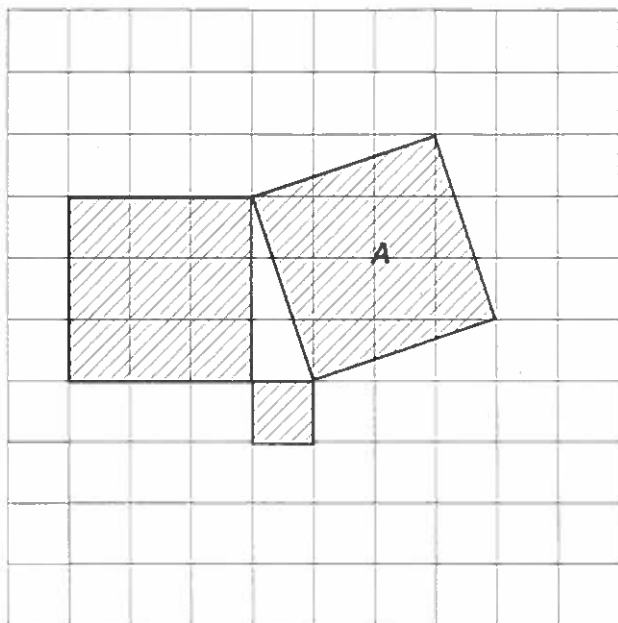


- 1) The length of a bracelet is 24 cm measured to the nearest centimetre.
 - a) Work out the lower bound of the length of the bracelet.
 - b) Work out the upper bound of the length of the bracelet.
- 2) The length of a snake is 80 cm measured to the nearest 10 centimetres.
 - a) Work out the lower bound of the length of the snake.
 - b) Work out the upper bound of the length of the snake.
- 3) The weight of a necklace is 145 g measured to the nearest 5 grams.
 - a) Work out the lower bound of the weight of the necklace.
 - b) Work out the upper bound of the weight of the necklace.
- 4) The length of a line is given as 17.2 cm measured to the nearest tenth of a centimetre.
 - a) Work out the lower bound of the length of the line.
 - b) Work out the upper bound of the length of the line.
- 5) A rectangle has a length of 80 cm and a width of 60 cm, both measured to the nearest 10 cm.
 - a) Work out the lower bound of the area of the rectangle.
 - b) Work out the upper bound of the perimeter of the rectangle.
- 6) A right-angled triangle has lengths as shown, all measured to the nearest centimetre.
 - a) Work out the lower bound of the area of the triangle.
 - b) Work out the upper bound of the area of the triangle.

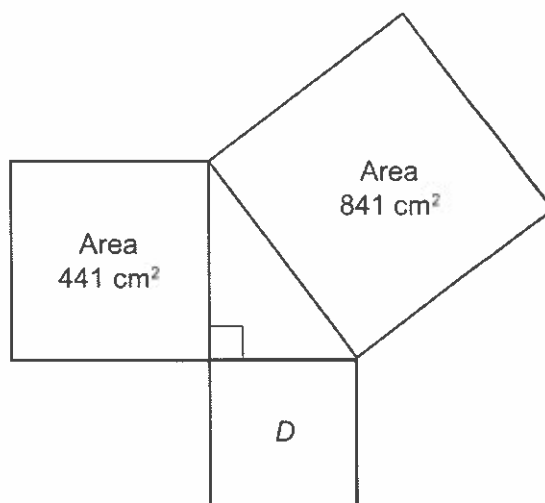
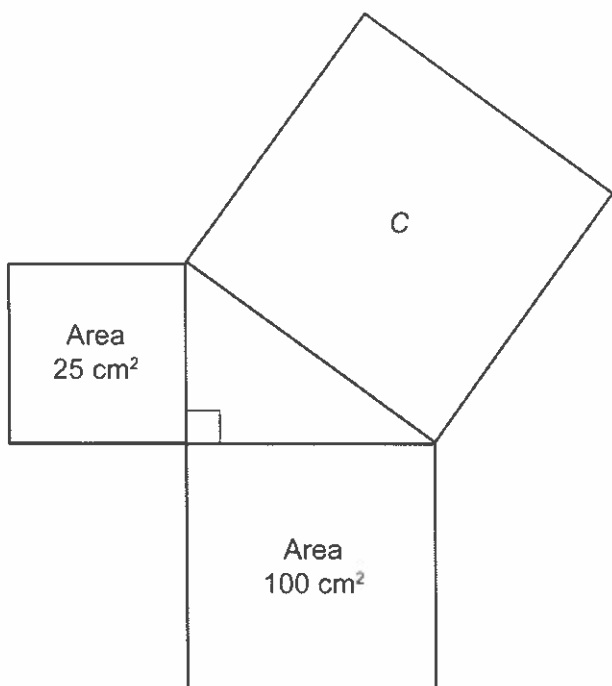


G30 Pythagoras

- 1) Use Pythagoras' theorem to work out the areas of squares *A* and *B*.



- 2) Use Pythagoras' theorem to work out the areas of squares *C* and *D*.



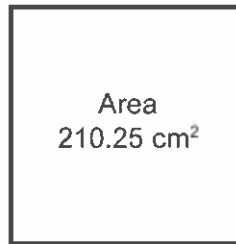
G30 Pythagoras

- 1) Find the lengths of the sides of these three squares.

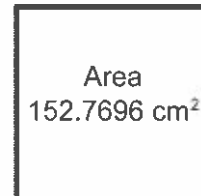
a)



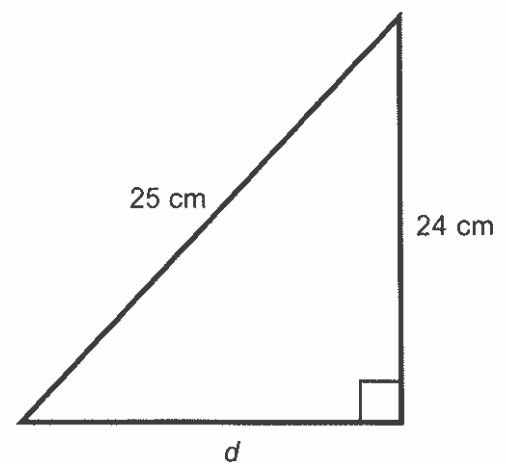
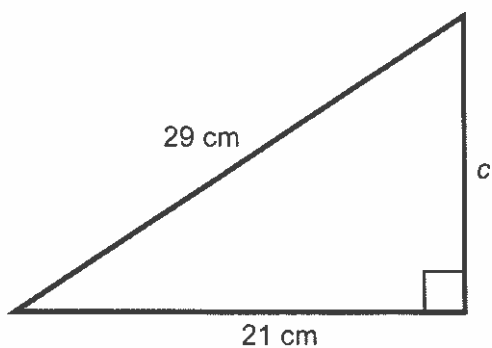
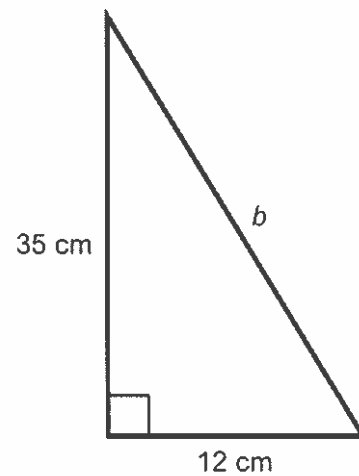
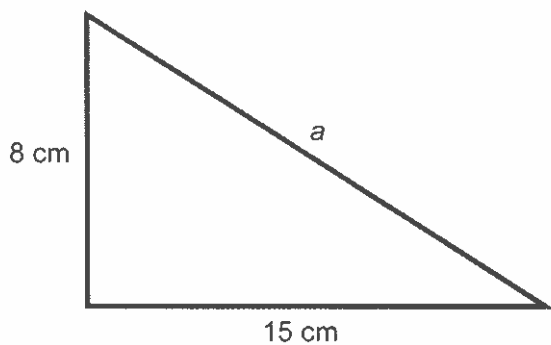
b)



c)

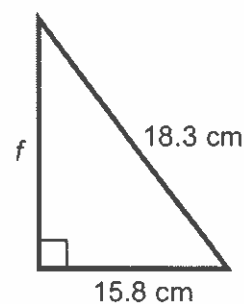
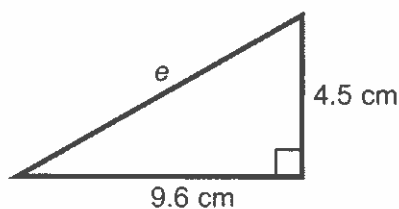
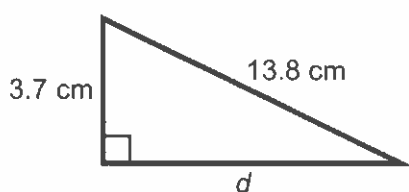
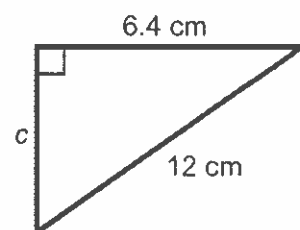
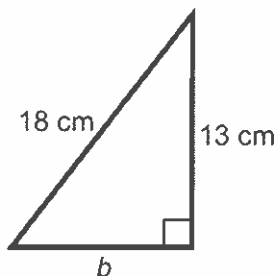
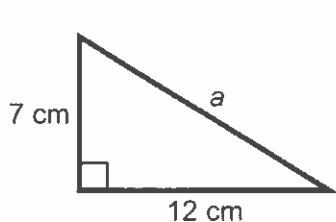


- 2) Find the lengths of the sides labelled *a* to *d*.

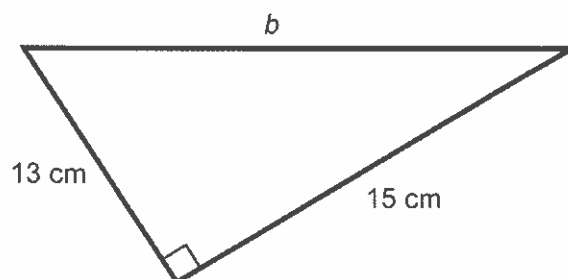
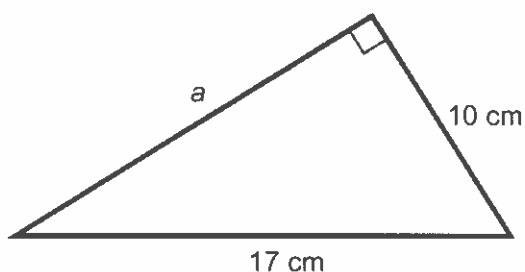


G30 Pythagoras

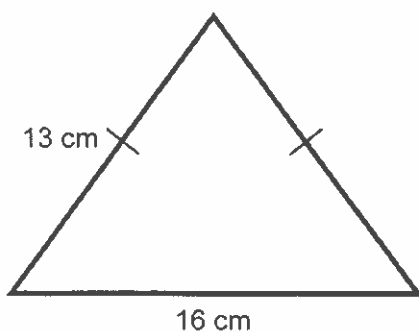
- 1) Calculate the lengths of the sides a to f , giving each answer to 1 decimal place.



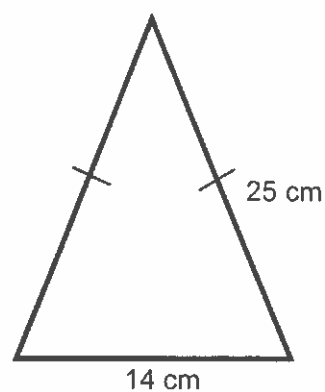
- 2) Calculate the lengths of the sides a and b , giving each answer to 1 decimal place.



- 3) Find the height of this isosceles triangle. Give your answer to 1 decimal place.



- 4) Find the area of this isosceles triangle.



P5**Two-Way Tables
Probabilities**

- 1) The two-way table shows the favourite colours of boys and girls.

	Red	Blue	Green	Total
Boys	9	8		28
Girls	7		12	
Total		21		60

- a) Complete the two-way table.
- b) What is the probability that a person chosen at random is a boy whose favourite colour is green?
- c) What is the probability that a person chosen at random is a girl whose favourite colour is red?
- d) What is the probability that a person chosen at random is a girl or has favourite colour blue or both?
- e) What is the probability that a person chosen at random is a boy or has favourite colour green or both?

P6

Venn Diagrams

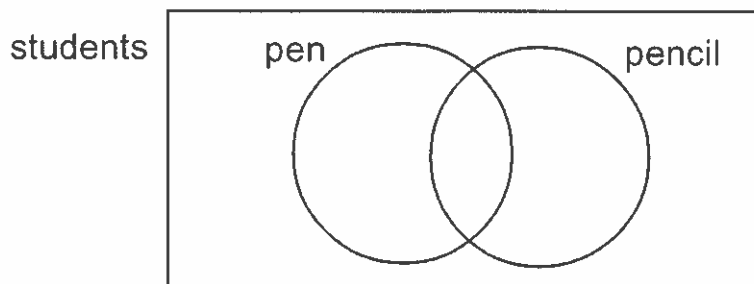
- 1) In a class of 25 students:

19 have a pen

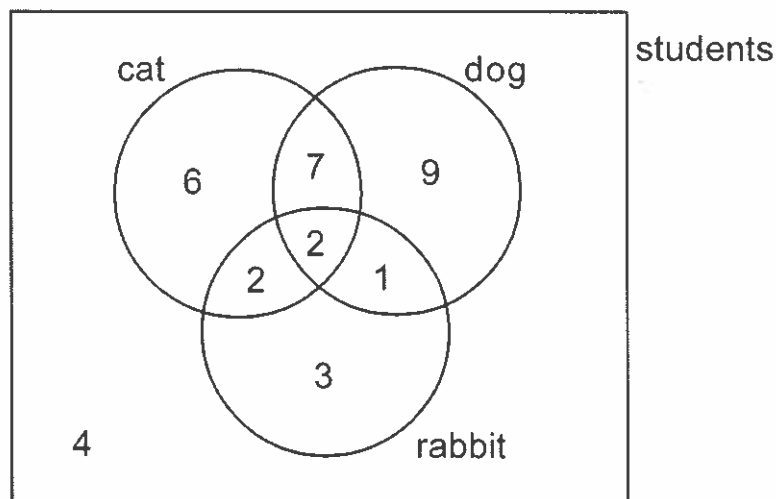
16 have a pencil

3 have neither

Put this information into the Venn diagram.



- 2) This Venn diagram represents the pets owned by a group of students.



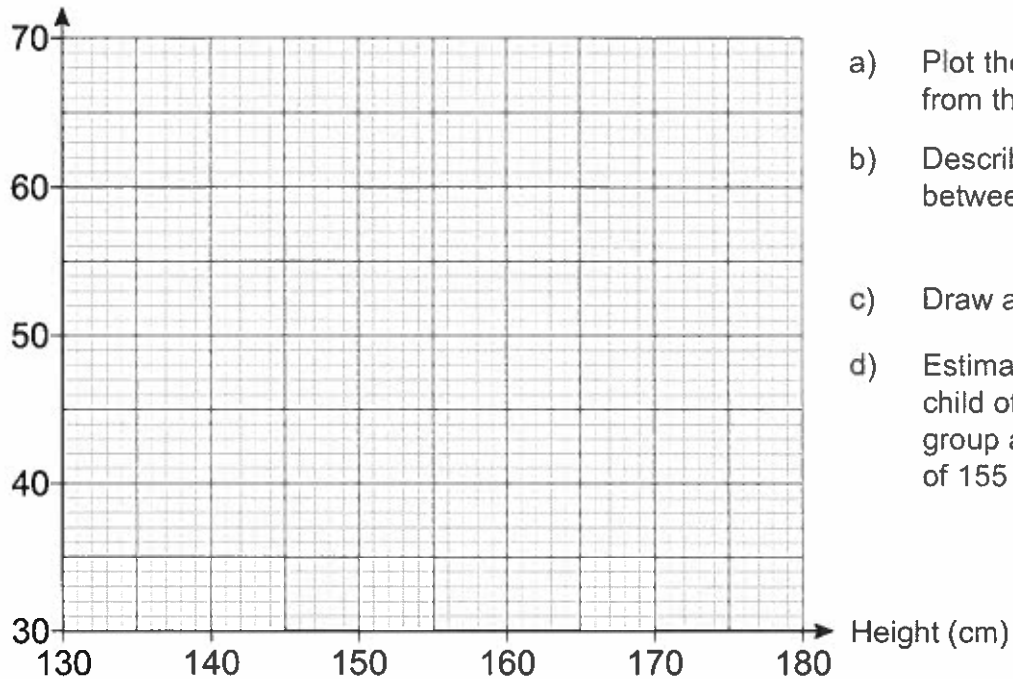
- How many students have a cat only?
- How many students have a cat and a rabbit?
- How many students have either a dog or a cat or both?
- What is the probability that a student, chosen at random, has a dog only?
- What is the probability that a student, chosen at random, has a cat, a rabbit and a dog?
- What is the probability that a student, chosen at random, has a dog or a rabbit or both?

S8

Scatter Diagrams

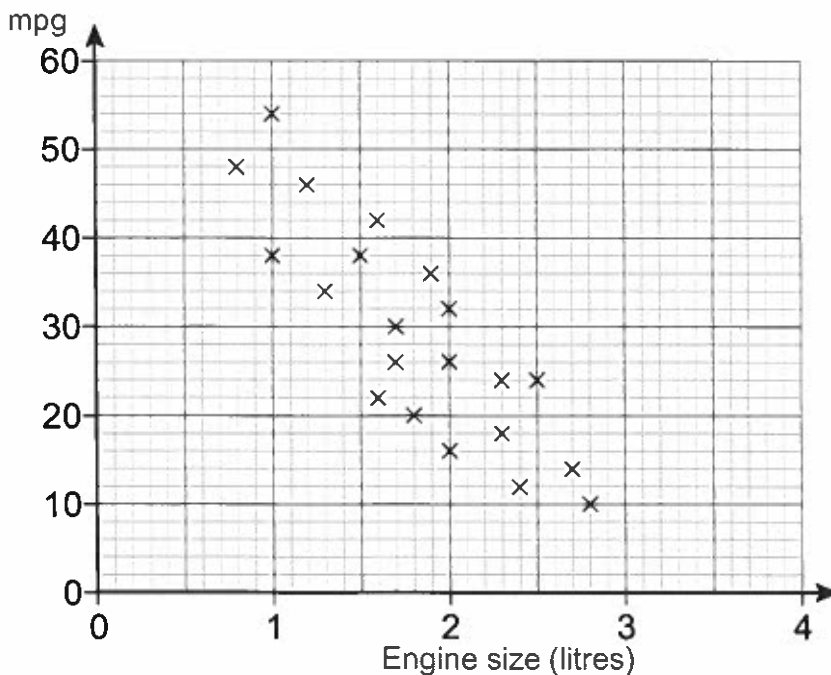
1) The heights and weights of some children are shown in the table, below.

Height (cm)	132	145	150	140	175	168	177	162	170	162	165	149	150	135	159	160
Weight (kg)	34	40	43	35	60	54	62	51	57	51	58	40	41	33	44	50



- Plot the information from the table.
- Describe the correlation between height and weight.
- Draw a line of best fit.
- Estimate the weight of a child of similar age to the group above with a height of 155 cm.

2) The scatter graph below relates car engine sizes to their fuel consumption in mpg.



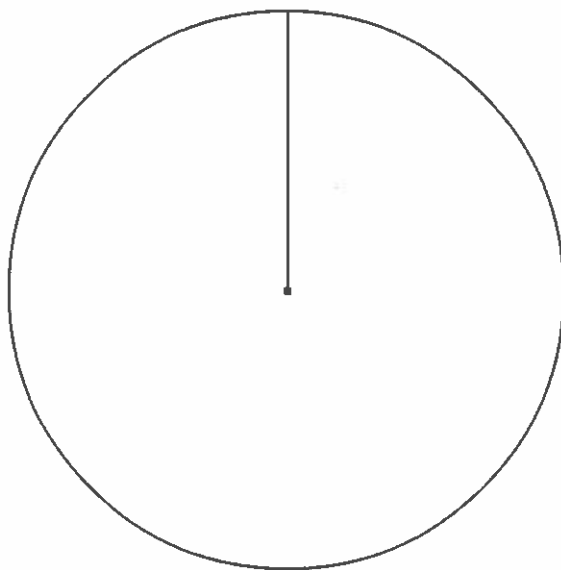
- Describe the correlation shown by the data.
- A car has an mpg of 25. Estimate the engine size.

S9

Pie Charts

- 1) The table on the right shows how far 90 visitors to a museum have travelled.

Draw a pie chart to show this information.

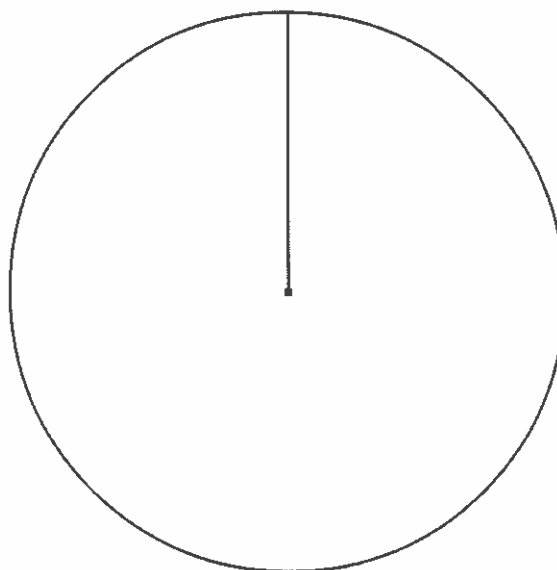


Distance	Frequency
Within the city	13
Within 30 miles of the city	9
Over 30 miles from the city	20
Overseas	48

- 2) The table shows the land usage of a farm.

Draw a pie chart to show this information.

Land usage	Area (hectares)
Arable	80
Pasture	70
Woodland	50
Waste	40



Excelling

NUMBER	N40a.....	Decimals Between 0 and 1 - Multiplying	119A
	N40b.....	Decimals Between 0 and 1 - Dividing	119B
	N41.....	Further Fractions - Adding and Subtracting	120
	N42a.....	Further Fractions - Multiplying	121
	N42b.....	Further Fractions - Dividing	121
	N43a.....	Estimating Answers - Multiplication	122A
	N43b.....	Estimating Answers - Division	122B
	N44.....	Using a Calculator	123
	N45a.....	Standard Form - Numbers Above 1	124A
	N45b.....	Standard Form - Numbers Between 0 and 1	124B
	N46.....	Exact Representation of Roots	125
ALGEBRA	A25.....	Trial and Improvement - Harder Questions	126A, 126B
	A26a.....	Further Simultaneous Equations - Introduction	127
	A26b.....	Further Simultaneous Equations - Solving	127
	A26c.....	Further Simultaneous Equations - Real-Life Contexts	127
	A27a.....	Regions - Basics	128
	A27b.....	Regions - Advanced	128
	A28.....	Exponential and Reciprocal Graphs	129
RATIO	R11a.....	Compound Measures - Speed	130
	R11b.....	Compound Measures - Density	130
	R12.....	Original-Value Problems	131
	R13.....	Inverse Proportion	132
GEOMETRY	G31.....	Congruent Triangles	133
	G32.....	Cones	134
	G33.....	Spheres	135
	G34.....	Enlargement - Negative Scale Factor	136
	G35a.....	Trigonometry - Finding a Side	137A
	G35b.....	Trigonometry - Finding an Angle	137B
PROBABILITY	P7.....	Relative Frequency	138
STATISTICS	S10a.....	Averages from Tables - Mode, Median, Mean	139A
	S10b.....	Averages from Tables - Estimate for the Mean	139B

N40a

Decimals Between 0 and 1 Multiplying

1) Work out the answers to the following:

- a) 24×0.2
- b) 13×0.4
- c) 60×0.7
- d) 243×0.2
- e) 0.6×700

2) Work out the answers to the following:

- a) 314×0.02
- b) 836×0.001
- c) 800×0.006
- d) 418×0.003
- e) 411×0.09

3) Work out the answers to the following:

- a) 0.2×0.4
- b) 0.1×0.03
- c) 0.02×0.06
- d) 0.08×0.003
- e) 0.05×0.08

4) Work out the answers to the following:

- a) 62×0.14
- b) 2.7×2.5
- c) 613×0.042
- d) 42.3×1.8
- e) 228×0.063

N40b

Decimals Between 0 and 1 Dividing

1) Work out the answers to the following:

- a) $6 \div 0.2$
- b) $8 \div 0.1$
- c) $9 \div 0.3$
- d) $4 \div 0.02$
- e) $7 \div 0.002$

2) Work out the answers to the following:

- a) $62 \div 0.2$
- b) $51 \div 0.3$
- c) $4.56 \div 0.04$
- d) $22.5 \div 0.05$
- e) $14.7 \div 0.007$

3) Work out the answers to the following:

- a) $7.24 \div 0.2$
- b) $8.13 \div 0.3$
- c) $1.512 \div 0.07$
- d) $0.16 \div 0.008$
- e) $0.0732 \div 0.04$

4) Work out the answers to the following:

- a) $0.718 \div 0.2$
- b) $0.0141 \div 0.003$
- c) $0.24 \div 0.012$
- d) $1.625 \div 0.0013$
- e) $47.1 \div 0.15$

N41

Further Fractions Adding and Subtracting

1) Work out

a) $\frac{1}{3} + \frac{1}{2}$

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

c) $\frac{2}{7} + \frac{3}{5}$

d) $\frac{1}{2} + \frac{2}{9}$

e) $\frac{3}{10} + \frac{3}{7}$

3) Work out

a) $1\frac{2}{3} + \frac{3}{4}$

b) $2\frac{1}{2} + \frac{5}{7}$

c) $\frac{2}{5} + 3\frac{1}{2}$

d) $1\frac{7}{10} + \frac{1}{5}$

e) $2\frac{3}{4} + \frac{5}{6}$

5) Work out

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

b) $\frac{3}{4} - \frac{2}{3}$

c) $\frac{4}{5} - \frac{3}{4}$

d) $\frac{5}{6} - \frac{2}{3}$

e) $\frac{3}{4} - \frac{3}{8}$

7) Work out

a) $4\frac{1}{2} - 2\frac{1}{2}$

b) $1\frac{2}{5} - 1\frac{1}{10}$

c) $3\frac{2}{3} - 1\frac{11}{15}$

d) $2\frac{3}{4} - 1\frac{5}{8}$

e) $5\frac{2}{3} - 1\frac{4}{9}$

2) Work out

a) $\frac{2}{3} + \frac{1}{6}$

b) $\frac{3}{5} + \frac{3}{10}$

c) $\frac{1}{2} + \frac{4}{5}$

d) $\frac{5}{6} + \frac{3}{5}$

e) $\frac{7}{12} + \frac{3}{4}$

4) Work out

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

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

c) $3\frac{1}{6} + 1\frac{1}{3}$

d) $2\frac{2}{9} + 1\frac{2}{3}$

e) $4\frac{1}{2} + 2\frac{3}{10}$

6) Work out

a) $1\frac{3}{4} - \frac{1}{2}$

b) $2\frac{4}{5} - \frac{3}{4}$

c) $3\frac{1}{6} - \frac{2}{3}$

d) $2\frac{2}{9} - \frac{5}{6}$

e) $6\frac{1}{2} - \frac{7}{8}$

8) Work out

a) $3\frac{4}{5} + 1\frac{1}{2}$

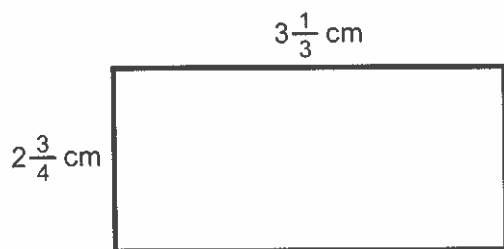
b) $4\frac{2}{9} - \frac{5}{6}$

c) $2\frac{3}{8} + 1\frac{5}{6}$

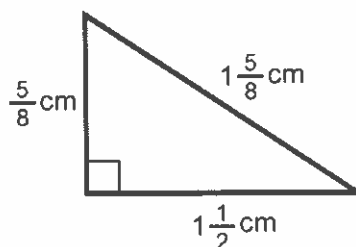
d) $2 - 1\frac{5}{8}$

e) $5 - 2\frac{1}{7}$

- 9) Find the perimeter of the rectangle below.
Give your answer as a mixed number.



- 10) Find the perimeter of the triangle below.
Give your answer as a mixed number.



- 11) If a length of copper tubing is $20\frac{1}{4}$ cm long and Jim cuts off a piece that is $17\frac{3}{5}$ cm long, what is the length of the copper tubing left over?

Further Fractions

N42_{a/b} Multiplying and Dividing

1) Work out

a) $\frac{1}{2} \times \frac{3}{4}$

b) $\frac{2}{3} \times \frac{4}{5}$

c) $\frac{10}{11} \times \frac{2}{3}$

d) $\frac{4}{9} \times \frac{2}{5}$

e) $\frac{4}{7} \times \frac{1}{9}$

3) Work out

a) $1\frac{1}{2} \times \frac{8}{9}$

b) $2\frac{2}{3} \times \frac{6}{7}$

c) $\frac{6}{11} \times 1\frac{1}{8}$

d) $4\frac{2}{5} \times \frac{10}{11}$

e) $3\frac{3}{4} \times \frac{8}{9}$

5) Work out

a) $\frac{2}{3} \div \frac{1}{2}$

b) $\frac{3}{4} \div \frac{2}{3}$

c) $\frac{2}{5} \div \frac{3}{4}$

d) $\frac{3}{7} \div \frac{6}{11}$

e) $\frac{3}{4} \div \frac{3}{8}$

7) Work out

a) $2\frac{1}{2} + 3\frac{1}{2}$

b) $3\frac{2}{5} + 1\frac{1}{10}$

c) $4\frac{1}{3} + 1\frac{11}{15}$

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

e) $5\frac{2}{3} + 1\frac{4}{9}$

2) Work out

a) $\frac{2}{3} \times \frac{3}{5}$

b) $\frac{3}{7} \times \frac{5}{6}$

c) $\frac{8}{9} \times \frac{6}{10}$

d) $\frac{1}{2} \times \frac{8}{9}$

e) $\frac{7}{10} \times \frac{5}{21}$

4) Work out

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

b) $3\frac{3}{4} \times 2\frac{2}{3}$

c) $4\frac{1}{6} \times 2\frac{2}{5}$

d) $2\frac{2}{9} \times 1\frac{1}{5}$

e) $3\frac{4}{7} \times 1\frac{13}{15}$

6) Work out

a) $\frac{3}{4} \div 1\frac{1}{5}$

b) $\frac{4}{7} + 1\frac{7}{9}$

c) $2\frac{1}{4} \div \frac{6}{7}$

d) $2\frac{3}{5} + \frac{9}{10}$

e) $1\frac{1}{2} \div \frac{3}{8}$

8) Work out

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

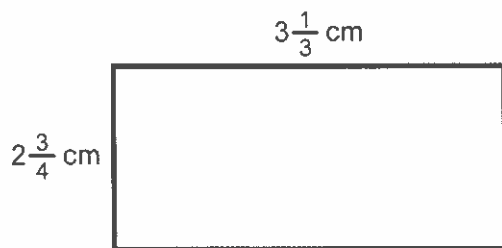
b) $1\frac{3}{4} \div 14$

c) $4 \div \frac{2}{5}$

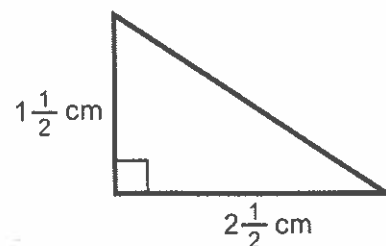
d) $5 \div \frac{3}{4}$

e) $3\frac{1}{2} \div 4$

- 9) Find the area of the rectangle below.
Give your answer as a mixed number.



- 10) Find the area of the triangle below.
Give your answer as a mixed number.



- 11) Jim has a length of copper tubing which is 85 cm long.
He wants to cut it into pieces which are $4\frac{1}{4}$ cm long.
If there is no wastage, how many pieces will Jim get?

N43a

Estimating Answers Multiplication

1) Estimate the value of:

- a) 21×34
- b) 42×56
- c) 17×62
- d) 29×78
- e) 66×96

2) Estimate the value of:

- a) 510×724
- b) 86×2146
- c) 753×184
- d) 48×6315
- e) 3642×1356

N43b

Estimating Answers Division

1) Estimate the value of:

a) $\frac{61}{19}$

b) $\frac{76}{43}$

c) $\frac{362}{78}$

d) $\frac{738}{96}$

e) $\frac{416}{781}$

2) Estimate the value of:

a) $\frac{357}{12 \times 23}$

b) $\frac{924}{34 \times 13}$

c) $\frac{172 \times 411}{430}$

d) $\frac{625 \times 43}{16 \times 38}$

e) $\frac{972 \times 368}{17 \times 23 \times 18}$

3) Estimate the value of:

a) $8 \div 0.12$

b) $6 \div 0.24$

c) $5 \div 0.49$

d) $7 \div 0.012$

e) $23 \div 0.18$

4) Estimate the value of:

a) $\frac{24 \times 510}{0.53}$

b) $\frac{46 \times 6.2}{0.135}$

c) $\frac{215 \times 38}{0.183}$

d) $\frac{18.3 \times 31.2}{0.017}$

e) $\frac{405 \times 274}{0.488}$

N44 Using a Calculator

1) Using a calculator, work out the value of:

- a) $24 + 16 \div 4$
- b) $3 + 8 \div 2 \times 3$
- c) $60 \times 2 - 20 \div 4$
- d) $(2 + 7 \times 8) \times 4$
- e) $(3 + 7) \times (8 - 2)$

2) Using a calculator, work out the value of:

- a) $6^3 - (2^4 + 3^5)$
- b) $(3^7 - 2^6) \div 10^4$
- c) $2^8 + 2^3 \times 5^2$
- d) $5^3 \times 3^5$
- e) $2^{20} - 3^8$

3) Using a calculator, work out the value of:

- a) $\sqrt{256} \times 2^4 - \sqrt{169}$
- b) $\sqrt{365} \times \sqrt{365}$
- c) $\sqrt{550 - 21}$
- d) $\sqrt{2^8 + 3^4 - 13}$
- e) $\sqrt{4^6 \times 2^8} \div (3^2 - 1)$

4) Using a calculator, work out the value of:

- a) $\frac{7 + 4 \times 8}{18 - 5}$
- b) $\frac{6^3 - 2^3}{(3^2 + 7) \div 2}$
- c) $\frac{\sqrt{729} + 21}{\sqrt{64}}$
- d) $\frac{62 \times 2^4 + 2^3}{\sqrt{4^3 + 3^2 + 3^3}}$
- e) $\frac{284 - \sqrt{2^9 - 112}}{(3 + 17) \times \sqrt{100}}$

N45a

Standard Form Numbers Above 1

- 1) Write these numbers in standard form:
 - a) 40 000
 - b) 200 000
 - c) 600
 - d) 9 000 000
- 2) Write these numbers as digits and then in standard form:
 - a) twenty thousand
 - b) eighty million
 - c) three hundred thousand
- 3) Write these as normal numbers:
 - a) 7×10^5
 - b) 6×10^9
 - c) 3×10^{12}
 - d) 2×10^{14}
- 4) Write these as normal numbers:
 - a) 2.4×10^5
 - b) 3.26×10^9
 - c) 4.01×10^{12}
 - d) 7.115×10^{13}
- 5) Write these numbers in standard form:
 - a) 45 000
 - b) 607 000 000
 - c) 8 300 000 000
 - d) 910 200

Standard Form

N45b Numbers Between 0 and 1

1) Write these as normal numbers:

- a) 6×10^{-4}
- b) 7×10^{-8}
- c) 3×10^{-6}
- d) 9×10^{-11}

2) Write these as normal numbers:

- a) 2.6×10^{-3}
- b) 3.4×10^{-6}
- c) 5.23×10^{-5}
- d) 9.806×10^{-9}

3) Write these numbers in standard form:

- a) 0.000 06
- b) 0.000 007
- c) 0.000 000 03
- d) 0.000 000 000 004

4) Write these numbers in standard form:

- a) 0.000 63
- b) 0.006 024
- c) 0.000 007 4
- d) 0.000 000 000 99

N46

Exact Representation of Roots



- 1) Give two consecutive integers that the answers to these questions lie between.

eg $\sqrt{7}$ is between 2 and 3

a) $\sqrt{15}$ is between ___ and ___

b) $\sqrt{23}$ is between ___ and ___

c) $\sqrt{79}$ is between ___ and ___



- 2) Which of these can be rewritten as an exact answer without the square root symbol? Where possible, write the answer.

a) $\sqrt{5}$

b) $\sqrt{25}$

c) $\sqrt{10}$

d) $\sqrt{18}$

e) $\sqrt{100}$



- 3) Find the decimal approximations for these, giving your answer to 1 decimal place:

a) $\sqrt{8}$

b) $\sqrt{21}$

c) $\sqrt{13}$

d) $\sqrt{46}$

e) $\sqrt{65}$

f) $\sqrt{99}$

Trial and Improvement Harder Questions

- Page 126A

Trial and Improvement Harder Questions

- Page 126B

A26a/b/c

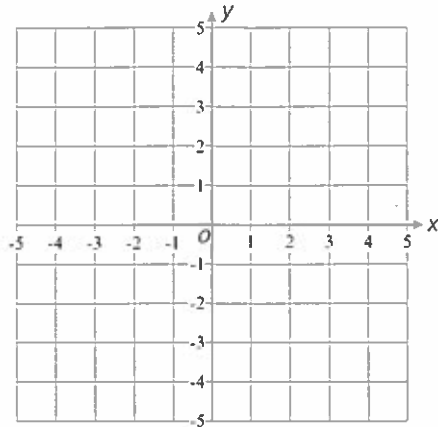
Further Simultaneous Equations

- 1) Solve $3x + y = 11$
 $4x - y = 3$
- 2) Solve $2x - 5y = 3$
 $4x + 5y = 21$
- 3) Solve $x - 2y = 3$
 $3x + 2y = 5$
- 4) Solve $x + 3y = 10$
 $x + y = 6$
- 5) Solve $3x + 2y = 3$
 $2x + 2y = 5$
- 6) Solve $5x - 3y = 23$
 $2x - 3y = 11$
- 7) Solve $3x - 2y = 6$
 $x + y = 7$
- 8) Solve $6x + y = 10$
 $2x - 3y = 10$
- 9) Solve $2x + 7y = 11$
 $3x - 2y = 4$
- 10) Solve $4x + 3y = 9$
 $5x + 2y = 13$
- 11) Solve $2x + 3y = -7$
 $7x - 2y = -12$
- 12) Solve $3x - 2y = 5$
 $9x + 5y = -7$
- 13) In the first week of opening, a zoo sold 200 adult tickets and 300 child tickets. The takings for that week were £2600.
In the second week, 500 adult tickets were sold and 400 child tickets were sold. The takings for the second week were £5100.
Form two equations and solve them to find the price of an adult ticket and the price of a child ticket.
- 14) If you multiply Sid's age by four and Tony's age by five and add the answers together it comes to 259 years.
However, if you multiply Sid's age by seven and then take away two times Tony's age the answer is 120 years.
Form two equations and solve them to find the ages of Sid and Tony.
- 15) If nine rats and seven ferrets cost £116.75 and four rats and six ferrets cost £88, how much would five rats and four ferrets cost?
- 16) If a mouse and a goldfish cost £1.10 and the mouse costs £1 more than the goldfish, how much does the goldfish cost?

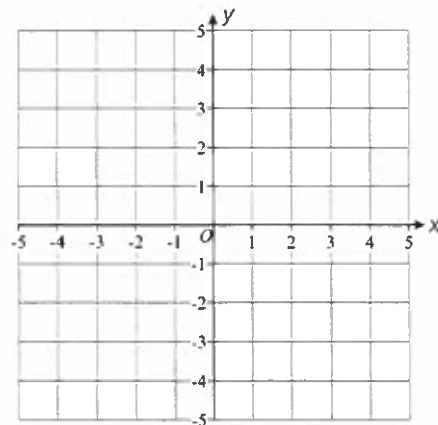
A27_{a/b}

Regions

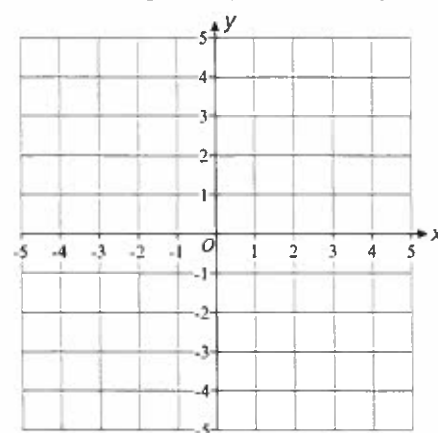
- 1) a) Shade the region represented by $x \leq -1$
b) Shade the region represented by $x > 3$



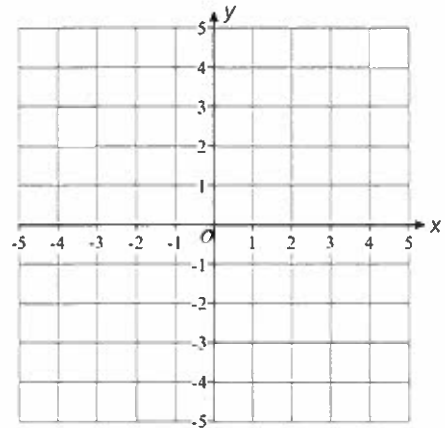
- 2) a) Shade the region represented by $y < -1$
b) Shade the region represented by $y \geq 2$



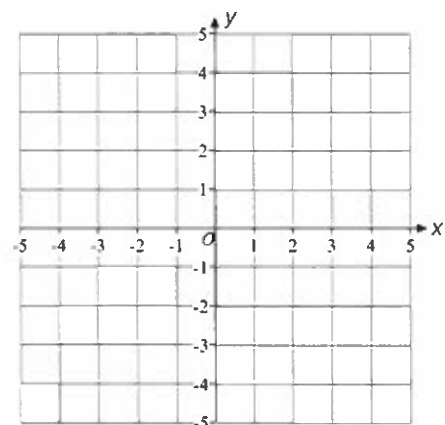
- 3) Shade the region represented by $-3 \leq x < 2$



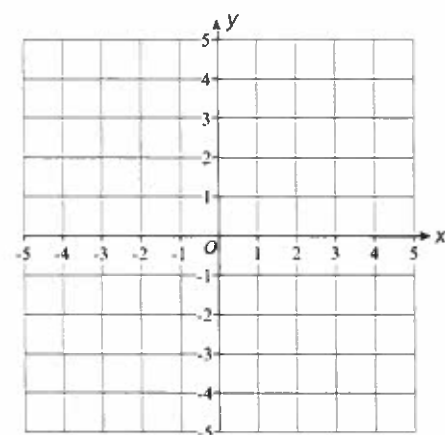
- 4) Shade the region represented by $1 \leq y \leq 4$



- 5) Shade the region where $-1 \leq x \leq 3$
and $-4 \leq y \leq -2$



- 6) Shade the region where $-3 < x < 2$
and $-1 < y < 4$



A28

Exponential and Reciprocal Graphs

- 1) A guitar was valued at £2000 on January 1st 1990.

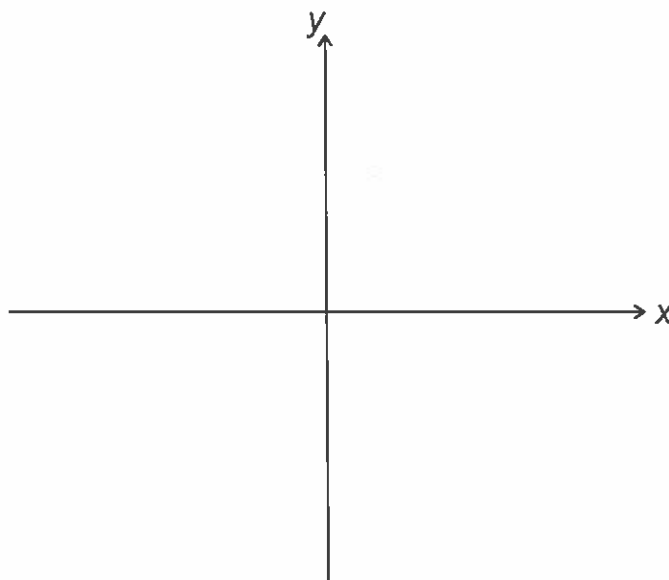
The value of the guitar is given by $V = 2000 \times 1.03^t$ where £ V is the value t years after 1st Jan 1990.

- a) Sketch the graph of $V = 2000 \times 1.03^t$ on the axes below, marking clearly where the graph crosses the y-axis.



- b) Use your calculator to work out the value of the guitar on 1st January 1995.
- c) Use your calculator to work out the value of the guitar on 1st January 1987.

- 2) Sketch the graph of $y = \frac{1}{x}$ on the axes below.



R11_{a/b} Compound Measures

- 1) A car travels at 60 mph for 3 hours.
How far does the car travel?
- 2) A cyclist cycles for 4 hours and covers a distance of 48 miles.
What was her average speed in miles per hour?
- 3) How long would it take a train which travels at an average speed of 80 mph to cover a distance of 400 miles?
- 4) A runner runs at a speed of 12 km/h for 3 hours and 15 minutes.
How far does he run?
- 5) An aeroplane flies at an average speed of 510 mph.
How long would it take to fly a distance of 2720 miles?
- 6) If a worm travels a distance of 8.25 m in 2 hours and 45 minutes, work out his average speed in metres per hour.
- 7) 12.5 cm^3 of mercury has a mass of 170 g.
Work out the density of mercury.
- 8) Platinum has a density of 21.4 g/cm^3 .
What is the mass of 35 cm^3 of platinum?
- 9) A quantity of ice had a mass of 62.56 g.
Knowing that ice has a density of 0.92 g/cm^3 , work out how much ice there was, in cm^3 .
- 10) 15000 cm^3 of nitrogen has a mass of 18.765 g.
Work out the density of nitrogen in g/cm^3 .
- 11) 15000 cm^3 of gold has a mass of 289.5 kg.
Work out the density of gold in g/cm^3 .

R12

Original-Value Problems

- 1) A shop has 25% off its prices in a sale.
Below are the sale prices of some items.
Find the original price of each item.
 - a) £3.60
 - b) £4.80
 - c) £21.00
 - d) £15.30
 - e) £99.00
 - f) £12.90

- 2) A shop has 20% off its prices in a sale.
Below are the sale prices of some items.
Find the original price of each item.
 - a) £4.00
 - b) £4.80
 - c) £12.00
 - d) £16.40
 - e) £120.00
 - f) £192.00

- 3) A shop has 15% off its prices in a sale.
Below are the sale prices of some items.
Find the original price of each item.
 - a) £17.00
 - b) £51.00
 - c) £42.50
 - d) £84.15
 - e) £52.70
 - f) £83.30

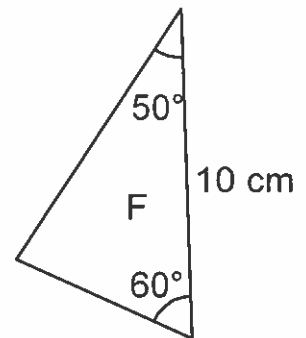
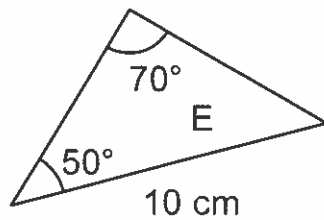
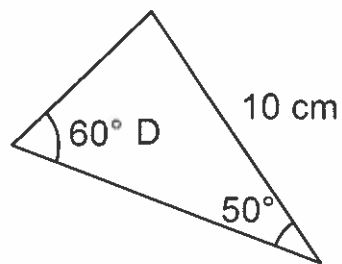
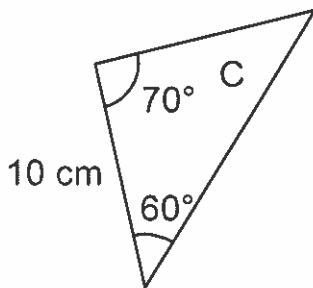
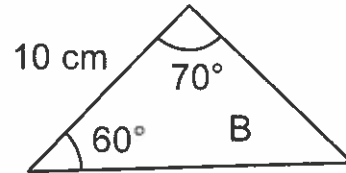
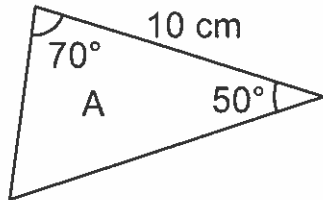
R13 Inverse Proportion

- 1) 3 people can paint a room in 2 hours.
 - a) How long would it take 1 person?
 - b) How long would it take 2 people?
 - c) How long would it take 6 people?
 - d) How long would it take 8 people?

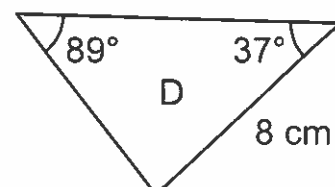
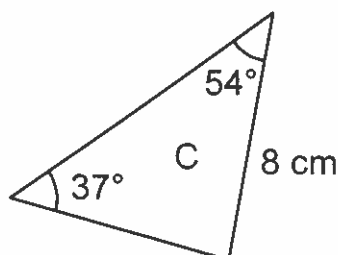
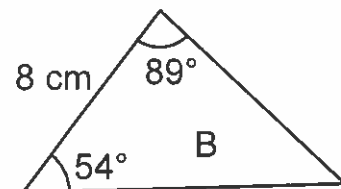
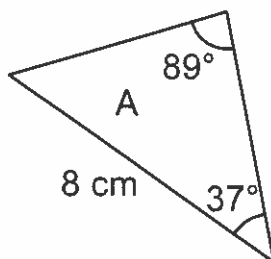
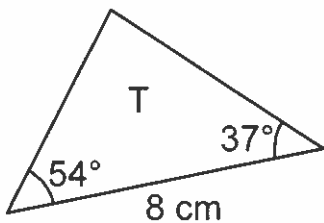
- 2) 5 people can harvest all of the apples in an orchard in 12 hours.
 - a) How long would it take 1 person?
 - b) How long would it take 12 people?
 - c) How long would it take 2 people?
 - d) How long would it take 9 people?

G31 Congruent Triangles

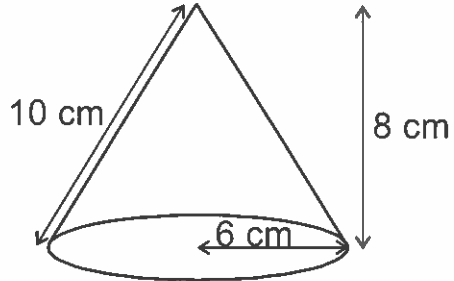
1) Sort these six triangles into 3 congruent pairs.



2) Which of the following triangles are congruent to triangle T?



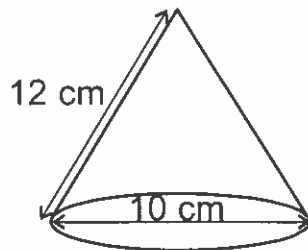
- 1) Here is a cone.



Find:

- a) the volume
- b) the curved surface area
- c) the total surface area

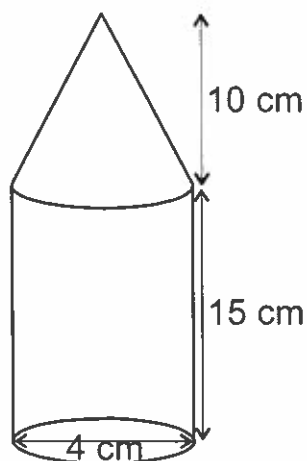
- 2) Here is a cone.



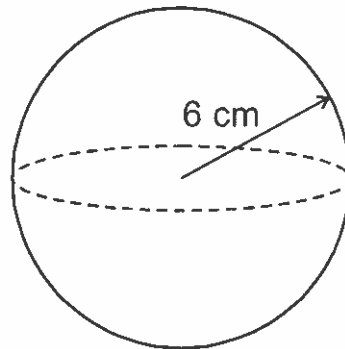
Find the total surface area.

- 3) A child's rocket is made from a cone and a cylinder.

Find the total volume of the toy rocket.

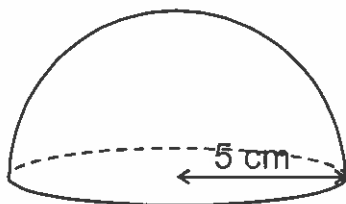


- 1) Find
- a) the volume of the sphere
 - b) the surface area of the sphere



- 2) Find the volume of
- a) a sphere with radius 10 cm
 - b) a sphere with diameter 16 cm
- 3) Find the surface area of
- a) a sphere with radius 9 cm
 - b) a sphere with diameter 20 cm

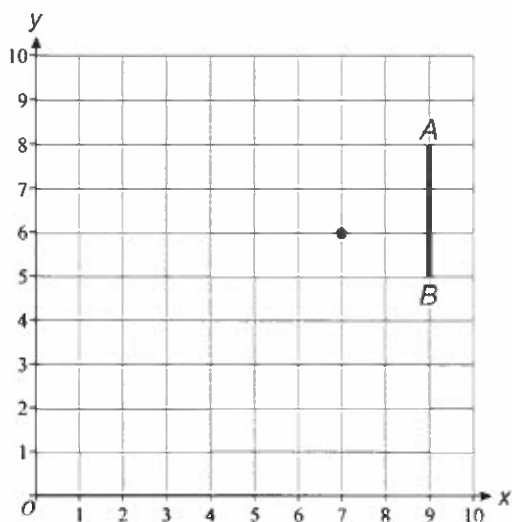
- 4) Here is a hemisphere



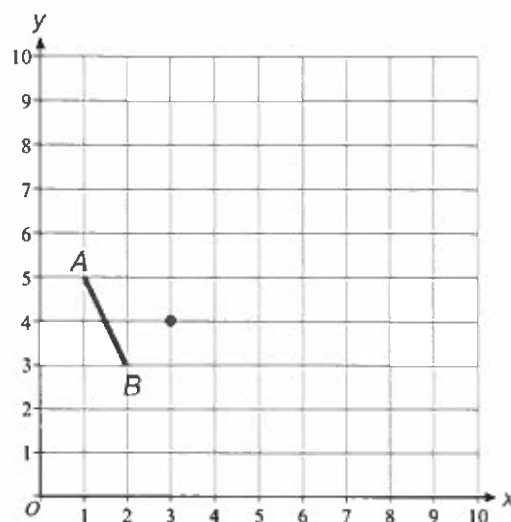
Find

- a) the volume of the hemisphere
- b) the total surface area of the hemisphere

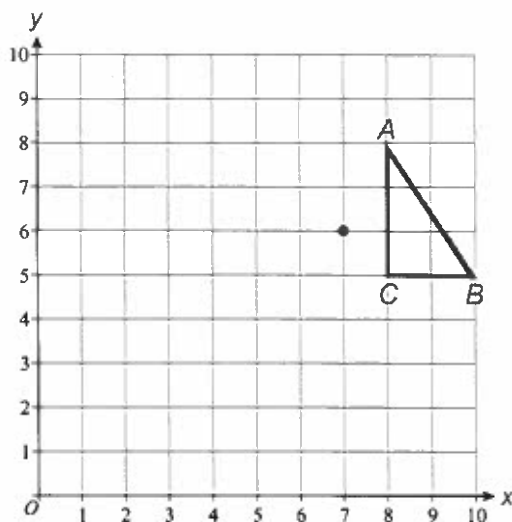
- 1) Enlarge line AB with scale factor -2 and point $(7, 6)$ as the centre of enlargement.



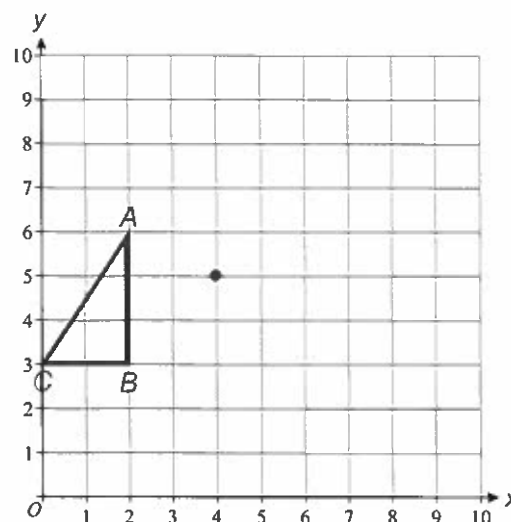
- 2) Enlarge line AB with scale factor -3 and point $(3, 4)$ as the centre of enlargement.



- 3) Enlarge triangle ABC with scale factor -2 and point $(7, 6)$ as the centre of enlargement.



- 4) Enlarge triangle ABC with scale factor -1.5 and point $(4, 5)$ as the centre of enlargement.

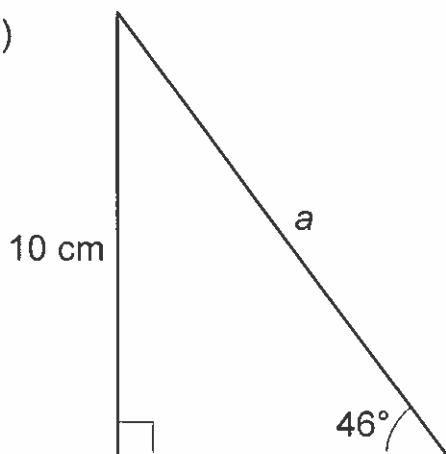


G35a

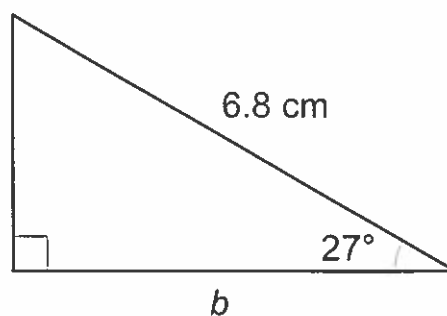
Trigonometry Finding a Side

Find the lengths of the missing sides, giving your answers to 1 decimal place,

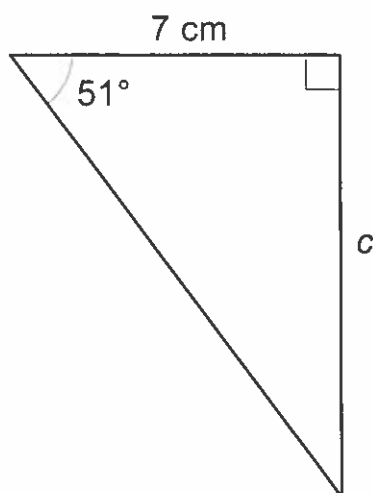
1)



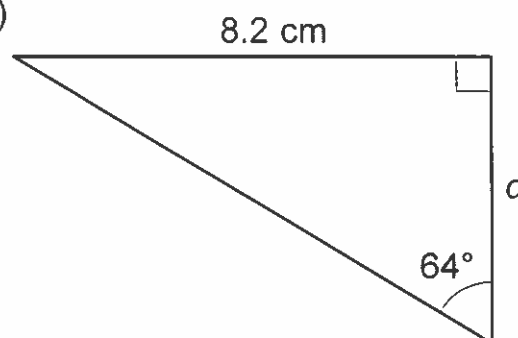
2)



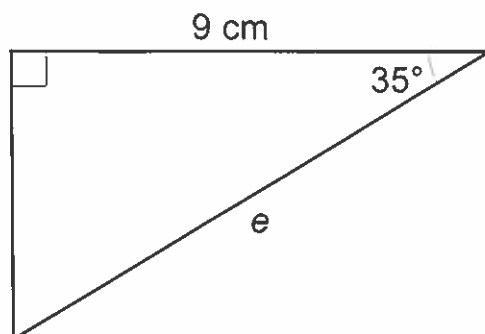
3)



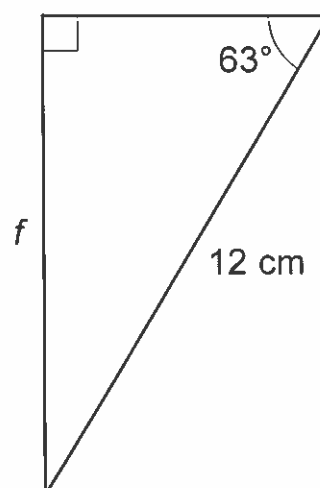
4)



5)



6)

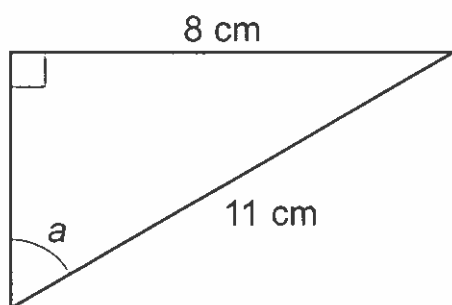


G35b

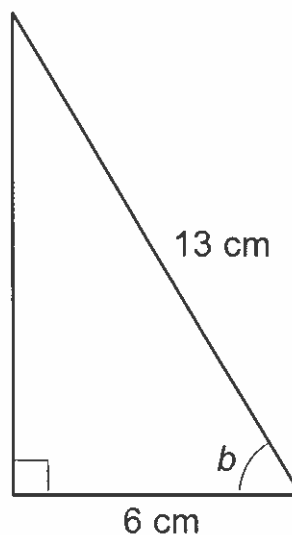
Trigonometry Finding an Angle

Find the sizes of the angles marked with letters, giving your answers to 1 decimal place,

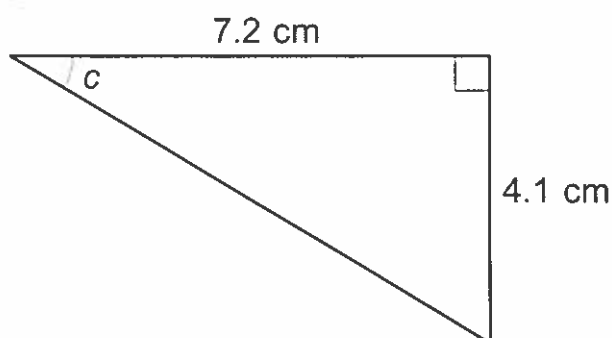
1)



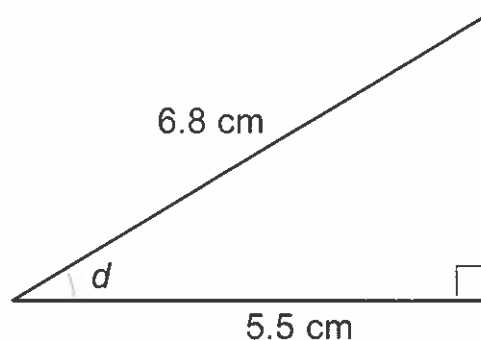
2)



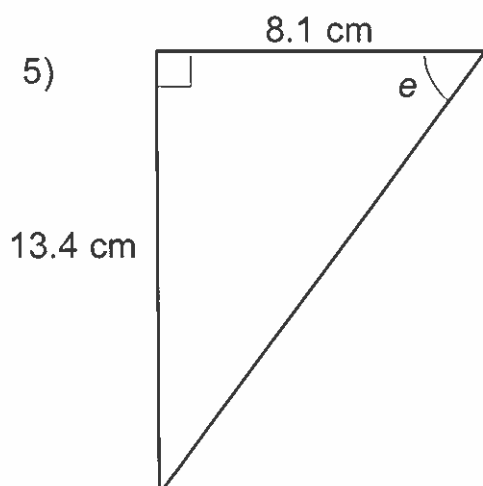
3)



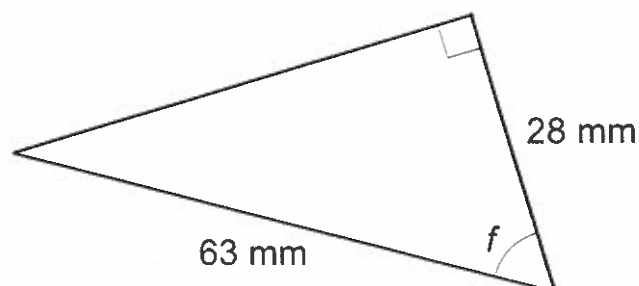
4)



5)



6)



P7

Relative Frequency

- 1) Peter bought an unfair dice from a Joke Shop.
He didn't know how the dice was biased and so he rolled it 100 times and noted down which numbers came up.
He found that the number 6 occurred 8 times.
 - a) What is the relative frequency of getting a six?
 - b) If Peter rolls the dice 400 times, estimate how many 6s he will roll.

- 2) Mary had a bag containing four different colour marbles.
She chose a marble, noted its colour and then replaced it, 80 times.
The results can be seen in this table.

Colour	No. of times chosen
Red	12
Blue	24
Green	18
Yellow	26

- a) Estimate the probability that a blue marble will be chosen on the next pick.
 - b) If a marble is chosen and replaced 280 times, estimate how many times you would expect to choose a red marble.
- 3) Benford's law says that if you look at real-life sources of data (heights of mountains, populations of countries, etc) the number 1 will be the first digit with relative frequency 0.3
If you go through any newspaper and write down the first 20 numbers you come across, about how many of the numbers would you expect to begin with a '1'.

S10a

Averages from Tables Mode, Median, Mean

Sally conducted a survey to see how many sandwiches each pupil brought to school in her class per day.
The results can be seen in the table.

No. of sandwiches	Frequency
0	1
1	5
2	6
3	12
4	2

- What is the modal number of sandwiches brought to school?
- What is the median number of sandwiches brought to school?
- Work out the mean number of sandwiches brought to school.
Give your answer to 1 decimal place.

S10b

Averages from Tables Estimate for the Mean

- 1) 50 hippos were captured over the course of a year and weighed. The results can be seen in the table, below.

Weight of hippo in tonnes	Frequency
$1.4 \leq w < 1.7$	5
$1.7 \leq w < 2.0$	9
$2.0 \leq w < 2.3$	15
$2.3 \leq w < 2.6$	12
$2.6 \leq w < 2.9$	7
$2.9 \leq w < 3.2$	2

Work out an estimate for the mean weight of a hippo. Give your answer to 1 decimal place.

- 2) Jenny had a theory that if asked to guess the length of a line, children under the age of 10 would overestimate the length but adults would underestimate the length.

To help her decide if she was correct she asked 100 under-10s and 100 adults to guess the length of a 34 cm line.

The results can be seen in the two tables, below.

*Children under the age
of 10 estimates*

Estimate of length in cm	Frequency
$20 \leq l < 24$	4
$24 \leq l < 28$	11
$28 \leq l < 32$	24
$32 \leq l < 36$	39
$36 \leq l < 40$	22

Adult estimates

Estimate of length in cm	Frequency
$20 \leq l < 24$	2
$24 \leq l < 28$	6
$28 \leq l < 32$	16
$32 \leq l < 36$	62
$36 \leq l < 40$	14

Use the results in the tables to see if Jenny was correct. Show all your workings.