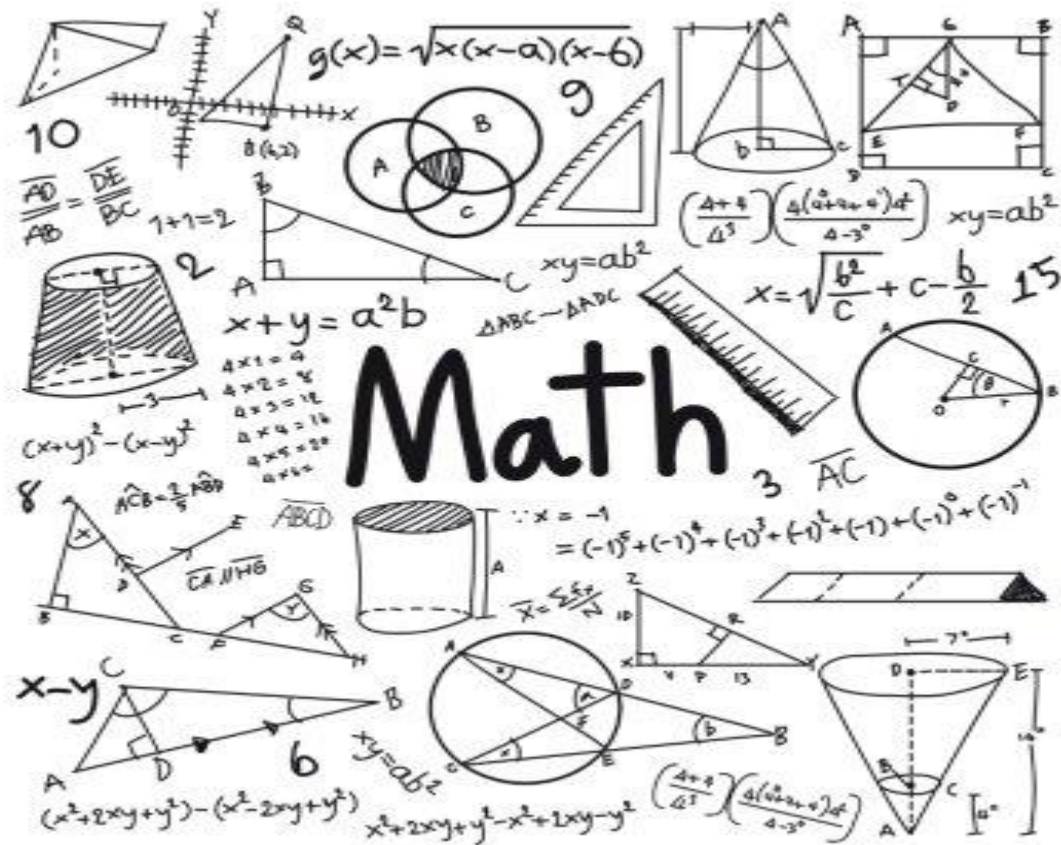


Year 10 Higher Preparation Maths Booklet



Getting ready for Year 10 Maths

Key steps to success - Complete each task on the following slides reviewing important KS3 content you need to know before starting KS4. These tasks cover; problem-solving, algebra, parallel line laws, money, trigonometry, density, and indices.

How to do it - on paper, in your old book, or on your iPad.

We don't mind how you do it as long as you have a go at each task!

If you are struggling with any of these questions why not go to Corbett maths which has extra videos, worksheets and GCSE questions on every single topic? You can also recap other topics you have done this year in maths or get ahead of the game and learn a new topic!

<https://corbettmaths.com/contents/>

Warm up – Key words

Find the hidden key words in this word search.

Then look up each word on google in a maths context and write down the definition.

For example – For the word the estimation you should google ‘what is the definition of estimation in maths’



FAMOUS MATHEMATICIAN



Hannah Fry is a world-leading mathematician who does a lot of work for the BBC. Why not look up one of her shows to watch!?!

Addition
Brackets
Division
HCF
Inverse
Multiple
Number Line
Prime
Square Root

Approximation
Column Method
Estimation
Index
LCM
Multiplication
Partitioning
Round
Subtraction

Bidmas
Common Factors
Greater Than
Indices
Less Than
Negative
Positive
Square Number
Venn Diagram

Task 1a – Indices – Watch the video

Laws of Indices

$$y^a \times y^b = y^{a+b}$$
$$y^2 \times y^3$$
$$y \times y \times y \times y \times y = y^5$$
$$w^3 \times w^5 = w^8$$
$$a^{-2} \times a^5 = a^3$$
$$2y^6 \times 5y^4 =$$

<https://corbettmaths.com/2013/03/13/laws-of-indices-algebra/>

Task 1b - Indices

The Mystery of Roger's Fedora

It's the night before the Wimbledon final and Roger, the favourite for the title, has lost his lucky fedora!

He left it in his locker, which he made sure he locked carefully before he went back to his hotel. Somebody had clearly broken into it to steal the treasured hat!

He suspects it might be his opponent, Nohat Djokovic, who has taken it; however, a police search found nothing. It must be somebody else!

Your task is to help Roger find his fedora and ensure the culprit is caught.

Evaluate each part to find what was used to break into Roger's locker.

Evaluate 5^2

Evaluate 4^3

Evaluate $\sqrt{16}$

Evaluate $\sqrt{121}$

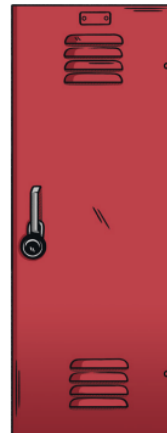
Evaluate $3^3 + 2^5$

Evaluate $(\sqrt{3})^2$

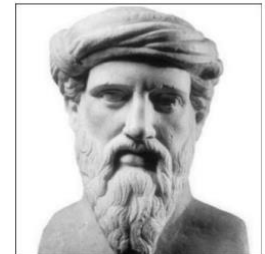
Add together all the answers.

If your answer is:

- 159 then the weapon is a bowl of strawberries and cream.
- 166 then the weapon is a shoelace.
- 172 then the weapon is a tennis racket.
- 174 then the weapon is a champagne bottle.



FAMOUS MATHEMATICIAN



Pythagoras was an Ancient Greek mathematician who discovered an amazing fact about right angled triangles. You will learn about this in GCSE maths. You can watch this video to find out about his "stupid death"...

<https://youtu.be/iBqEpC-dHqk>

Task 1c - Indices

Simplify each answer to find the name of the criminal.

Each box contains three statements. The criminal made three mistakes. Make sure you correct any mistakes you find!

The ball boy says:

- $a^3 \times a^7 = a^{21}$
- $b^7 \div b^3 = b^4$
- $(c^3)^2 = c^6$

The umpire says:

- $4a^3 \times 2a^5 = 6a^8$
- $10b^5 \div 2b^{-4} = 5b^9$
- $(2c^5)^2 = 4c^{10}$

The ball girl says:

- $a^5 \times a^9 = a^{13}$
- $b^4 \div b^{-2} = b^2$
- $(c^5)^4 = c^{20}$

The line judge says:


- $5a^4 \times 3a^6 = 8a^{24}$
- $12b^4 \div 4b^{-4} = 3$
- $(2c^4)^3 = 6c^7$



Task 2a – Parallel Line Laws – Watch the video

example 3

Find a and give a reason for your answer.



Co-interior
 180°

53°

a

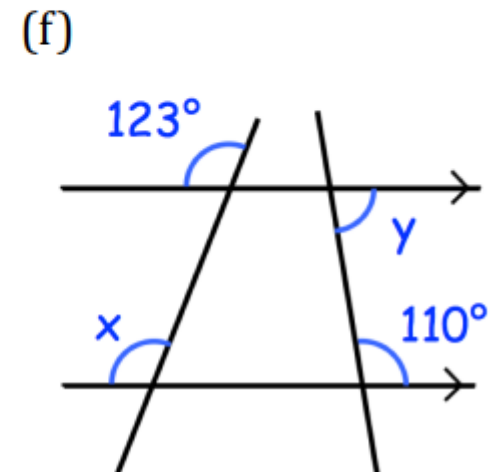
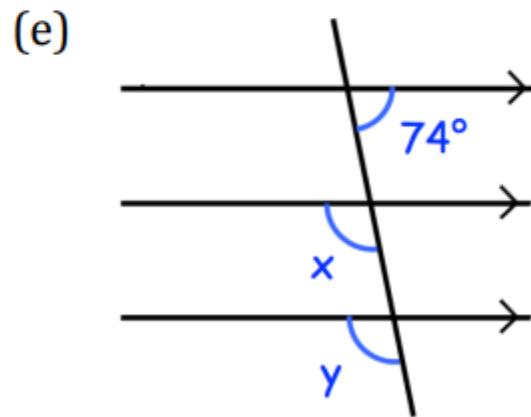
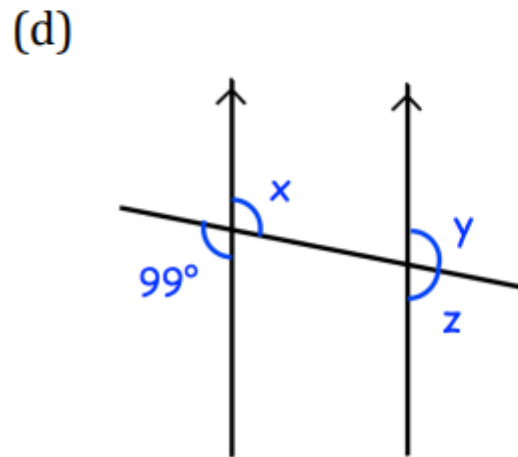
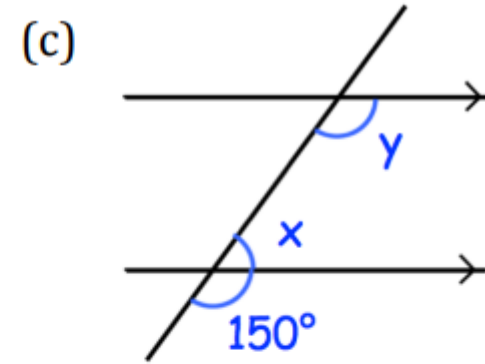
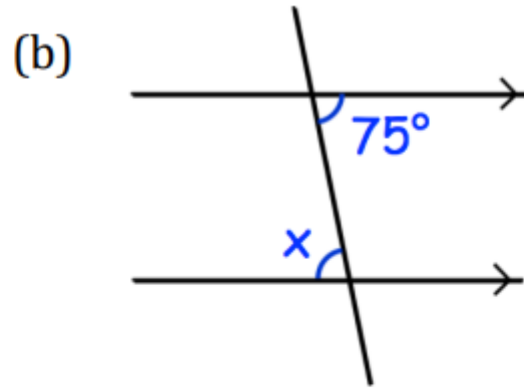
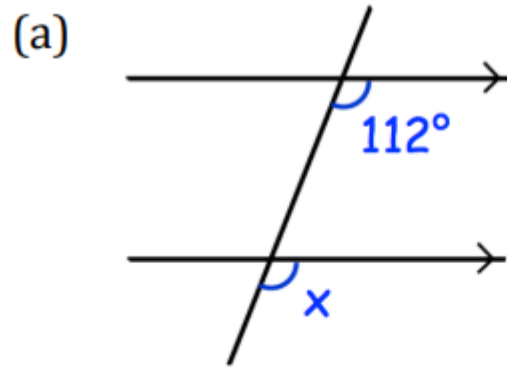
180
 $- 53$

$a =$ _____

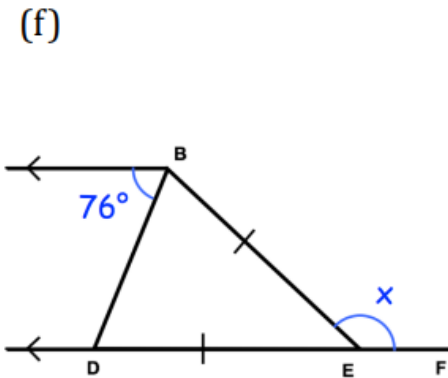
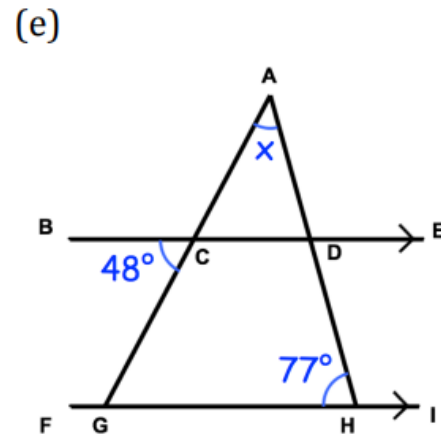
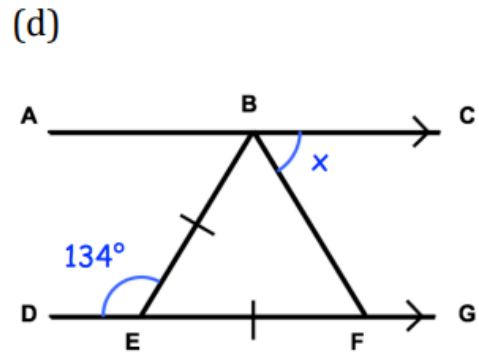
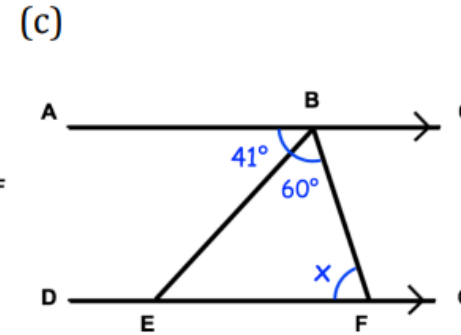
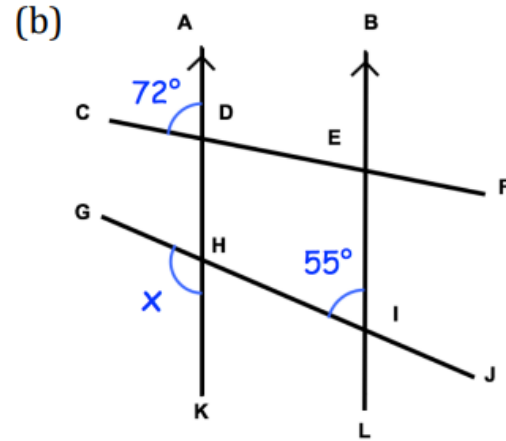
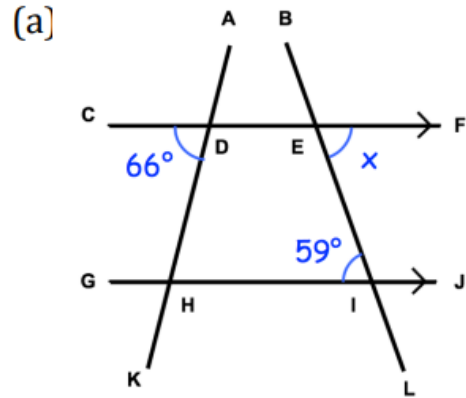
Reason:

<https://corbettmaths.com/2013/04/04/parallel-lines-angles/>

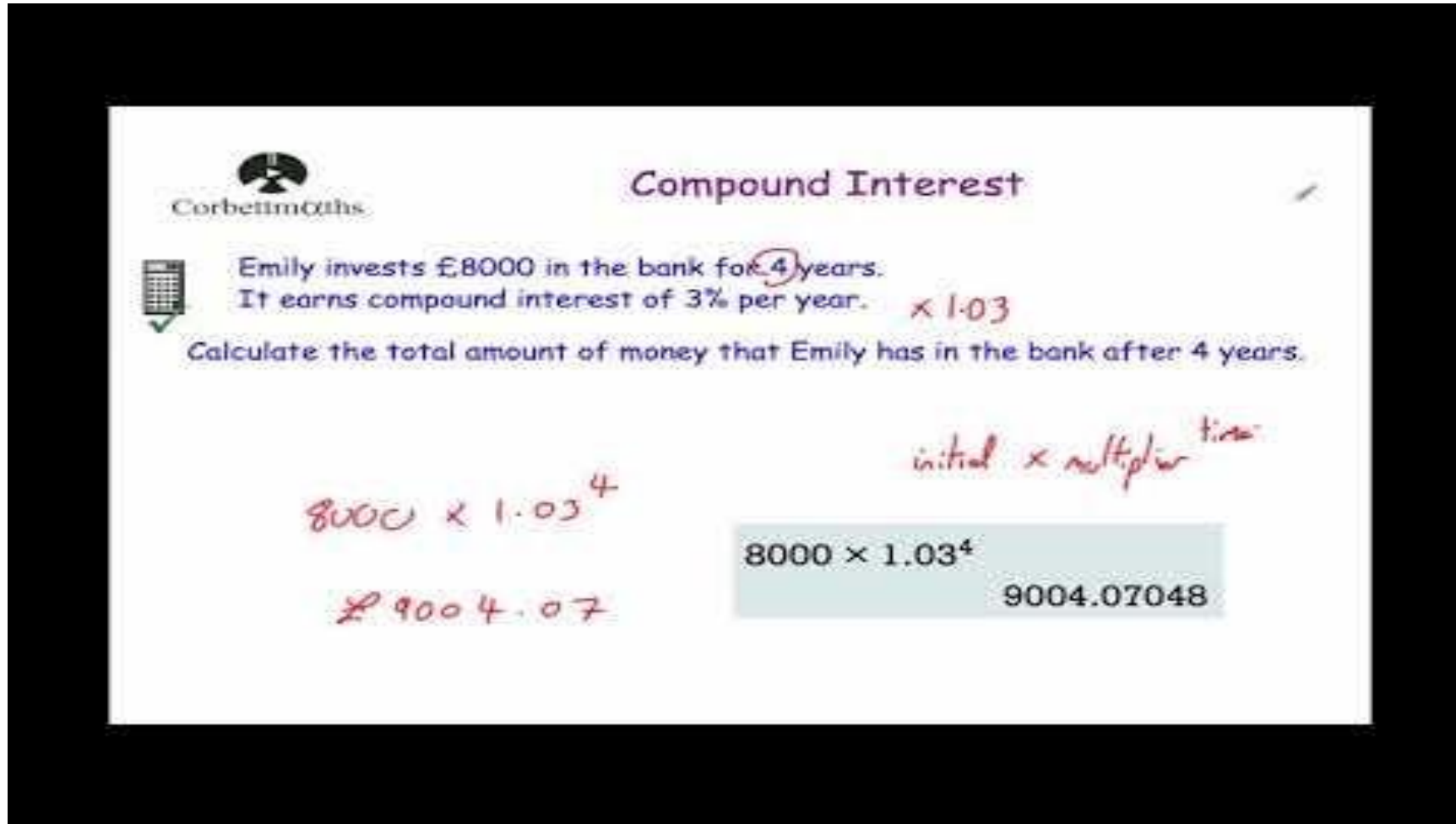
Task 2b – Find the missing angles



Task 2b – Find the missing angles



Task 3a – Compound Interest – Watch this video



Corbettmaths

Compound Interest

Emily invests £8000 in the bank for 4 years.
It earns compound interest of 3% per year. $\times 1.03$

Calculate the total amount of money that Emily has in the bank after 4 years.

8000×1.03^4

$\pounds 9004.07$


initial \times multiplier ^{times}


8000×1.03^4


9004.07048


<https://corbettmaths.com/2012/08/21/compound-interest/>

Task 3b – Compound Interest

Question 1:  Paul leaves £4000 in the bank for two years.
It earns compound interest of 5% per year.
Calculate the total amount Paul has in the bank at the end of the two years.


Question 2:  The population of birds on an island is estimated to increase by 10% every year.
The population of birds on the island is 20000.
Calculate an estimate for the population of birds in three years time.

Question 3:  The value of a car decreases by 5% each year.
Sophie bought a car two years ago for £10000
Work out the value now.

Question 4:  Sam invests £1800 in the bank for four years.
It earns compound interest of 4% each year.
Calculate the total amount Sam has in the bank at the end of four years.



Question 5:



budget@home

Car Value

You bought your car for **£4 295**

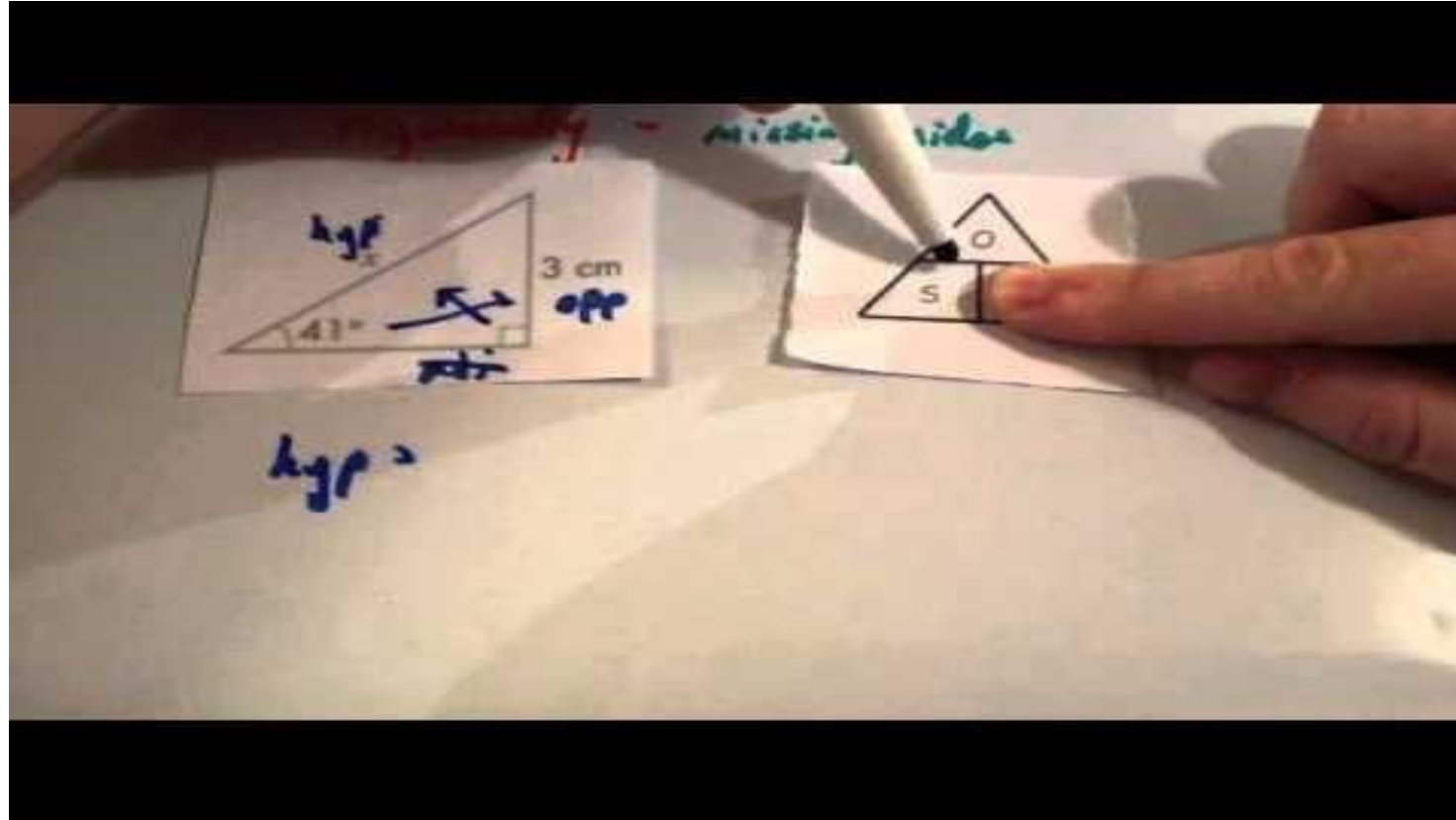
You want to predict how the value of your car will decrease over the next few years and have found a statistic to help you:

On average, car values decrease by **15% every year.**

Show how much your car will be worth in:

1. One year
2. Five years
3. 12 years

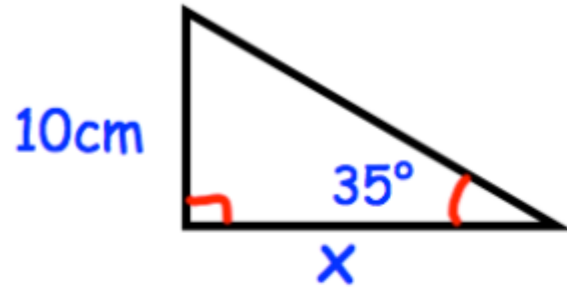
Task 4a – Trigonometry – Watch the video



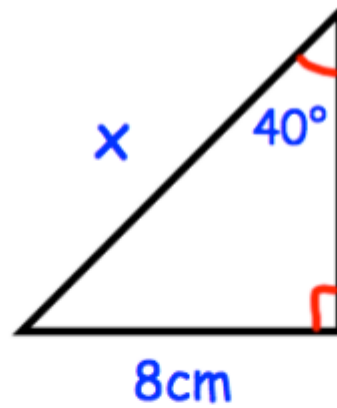
<https://corbettmaths.com/2013/03/30/trigonometry-missing-sides/>

Task 4b - Trigonometry

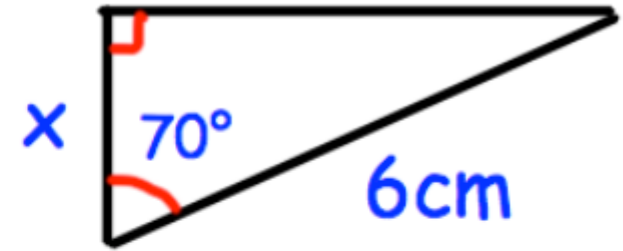
(a)



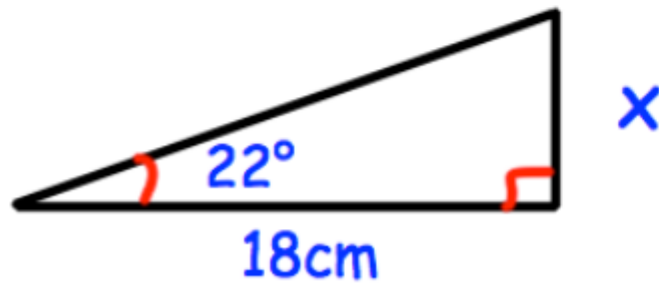
(b)



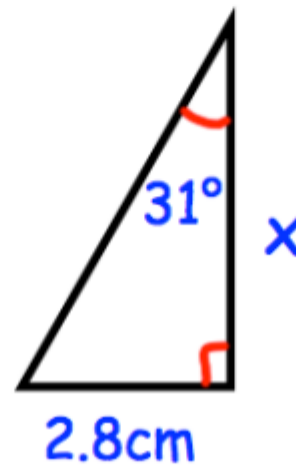
(c)



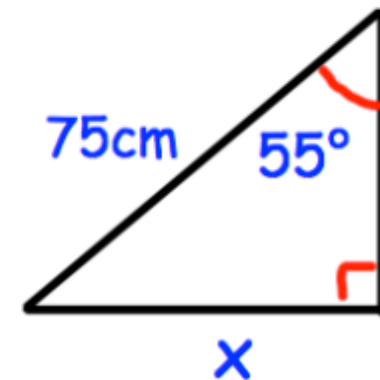
(d)



(e)

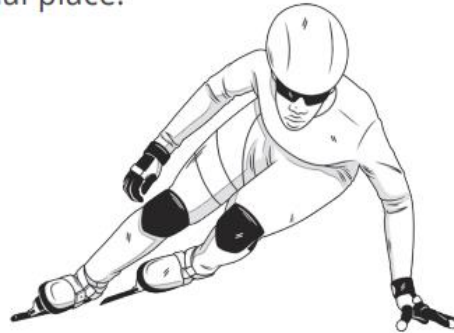
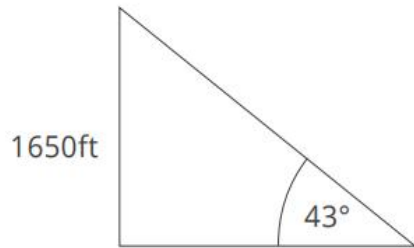


(f)



Task 4c - Trigonometry

- . The biathlon combines cross-country skiing with rifle shooting.
 - a. The start of the ski slope is 1650ft above the end of the slope. The competitors descend the slope at an angle of 43° with the horizontal. Calculate the length of the slope. Give your answer correct to one decimal place.



- b. Now find the other missing side.

FAMOUS MATHEMATICIAN



Ava Lovelace was the daughter of famous poet Lord Byron and is considered to be the first "computer programmer" after she wrote a computing machine algorithm in the 19th Century.

Task 5a – Algebra Problem Solving

$$\text{Smiling Face with Sunglasses} + \text{Smiling Face with Sunglasses} + \text{Smiling Face with Sunglasses} = 15$$

$$\text{Smiling Face with Sunglasses} + \text{Crying Face} + \text{Crying Face} = 9$$

$$\text{Smiling Face with Sunglasses} + \text{Winking Face with Tongue} + \text{Crying Face} = 11$$

$$\text{Smiling Face with Sunglasses} + \frac{1}{2} \text{Crying Face} \times \text{Winking Face with Tongue} = ?$$

$$\text{Smiling Face with Heart Eyes} + \text{Smiling Face with Heart Eyes} + \text{Smiling Face with Heart Eyes} + \text{Winking Face with Tongue} = 47$$

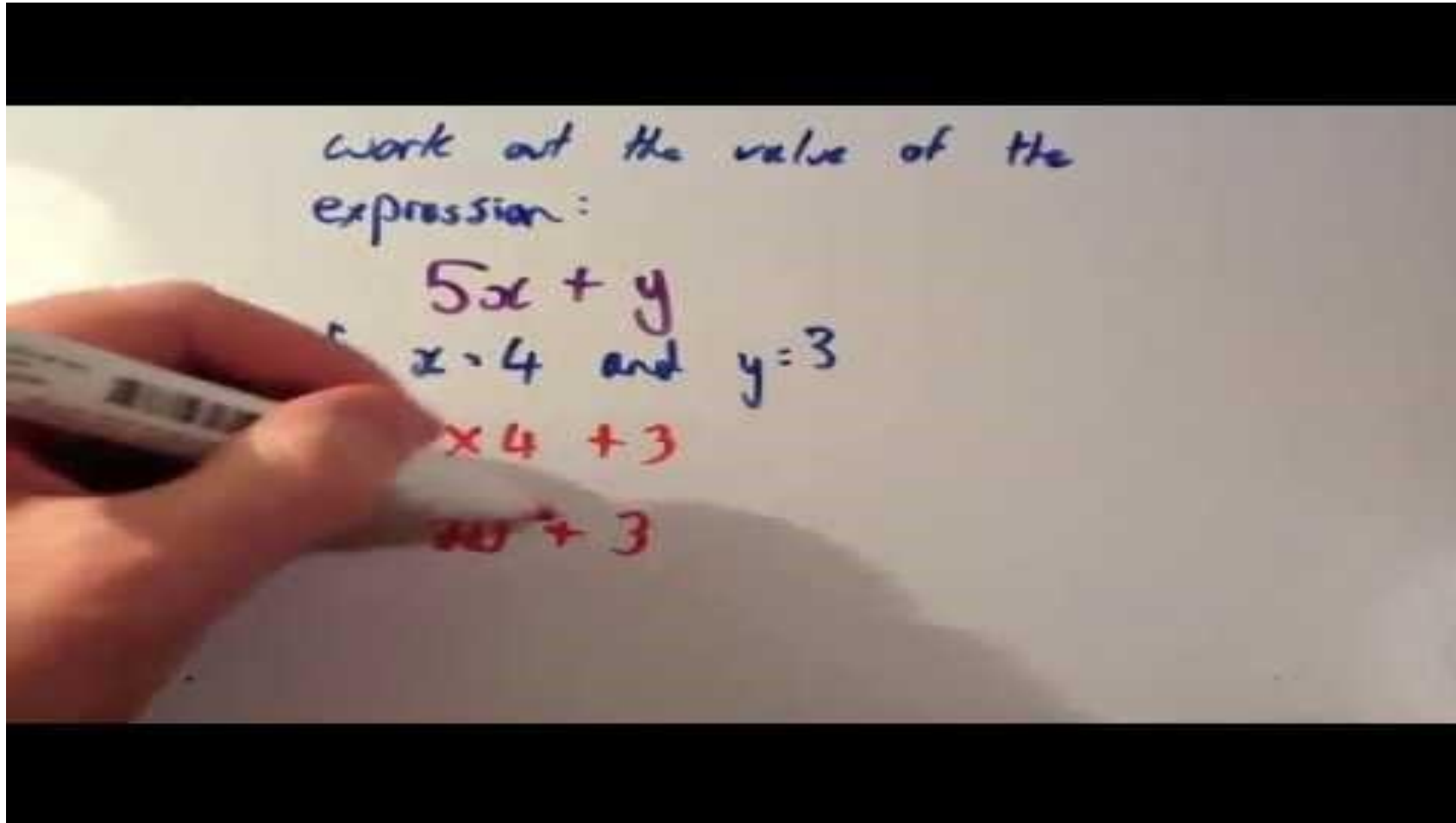
$$\text{Winking Face with Tongue} + \text{Winking Face with Tongue} + \text{Smiling Face with Heart Eyes} + \text{Smiling Face with Heart Eyes} = 44$$

$$\text{Winking Face with Tongue} = ?$$

$$\text{Smiling Face with Heart Eyes} = ?$$

Hint: start at the top

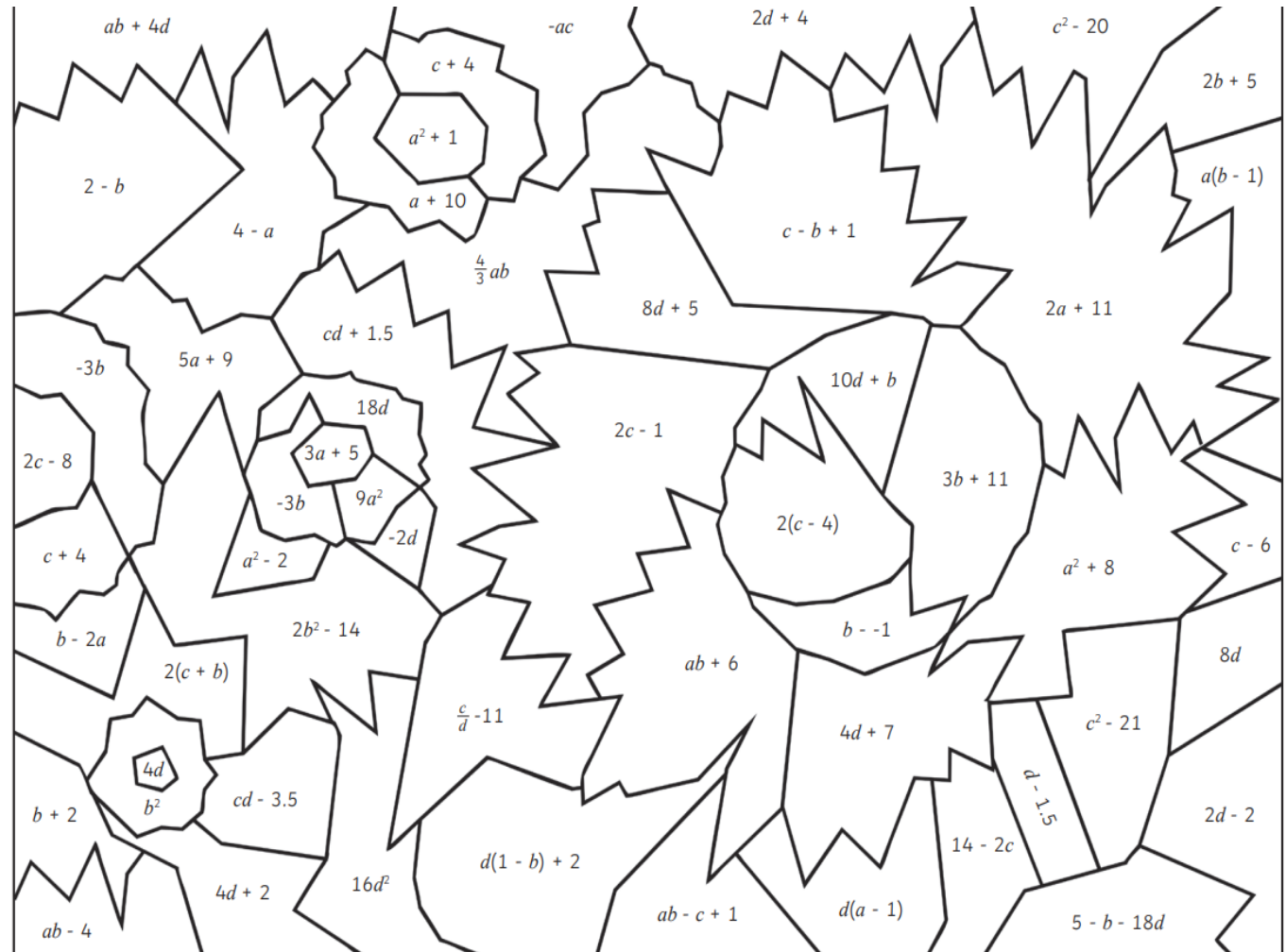
Task 5b – Algebra Substitution – Watch the video




Task 5c – Algebra Substitution

Substitute the values $a = -1$, $b = -3$, $c = 5$ and $d = 0.5$ into each expression. Colour the segment by finding your answer in the key.

Light Blue	5
Yellow	9
Brown	2
Light Green	-1
Dark Green	4




Task 6a – Density – Watch the video



Corbettmaths


Density

The cylinder below is made from glass.
The density of glass is 2.5g/cm^3
Calculate the mass of the cylinder



7cm

20cm

$$V = \pi r^2 h$$
$$= \pi \times 7^2 \times 20$$
$$= 980\pi$$
$$M = D \times V$$
$$= 2.5 \times$$
$$=$$


Task 6b - Density

Question 1: Work out the density of each of the following.
State the units of each answer.

- (a) A piece of wood has a mass of 7g and a volume of 10cm^3
- (b) A rod of aluminium has a mass of 575.4g and a volume of 210cm^3
- (c) A piece of nickel has a mass of 3.48kg and a volume of 400cm^3
- (d) An iron statue with volume of 0.05m^3 and a mass of 394kg
- (e) 2.1m^3 of oil with a mass of 1775kg

Question 2: Work out the mass of each of the following.
State the units of each answer.

- (a) A statue with a volume of 120cm^3 made from ceramic which has a density of 2g/cm^3 .
- (b) A rod with a volume of 50cm^3 made from copper which has a density of 8.9g/cm^3 .
- (c) A block with a volume of 1.8m^3 made from silver which has a density of 10490kg/m^3
- (d) A statue with a volume of 3m^3 made from zinc which has a density of 7.14g/cm^3
- (e) 2800cm^3 of butter which has a density of 911kg/m^3

Question 3

The Maths of Sandcastles Extension

Density of water = 1kg/litre

Density of sand = 1602 kg/m^3

- Convert the density of water into kg/m^3 .
- Calculate the volume of the symmetrical sandcastle shown. Give your answer to 3 decimal places with a suitable unit.
- If the castle is made from a mixture of water and sand in the ratio 1:4, what is its mass? Give your answer to 3 decimal places.
- Sanjay makes the castle as shown from a mixture of water and sand in the ratio 1:4. His friend Burt makes the castle without one of the cylindrical towers from a mixture of water and sand in the ratio 1:6. Which castle has the greatest mass?

