



Y12

Induction Pack



<https://visit.cern/globe/wandering-immeasurable>

Sich regen bringt Segen

Name _____ Tutor Group _____

A LEVEL PHYSICS

Previous school attended (if not STM)

GCSE Results

Subject	Grade	Subject	Grade

Average GCSE Grade _____

Other A Level options

Reasons for choosing A Level Physics



A LEVEL PHYSICS

Working together- our learning classroom

As we begin a new school year together, I would really like to get to know you, what you enjoy about this subject and how you learn best. Please spend a few minutes answering the following questions as honestly as you can.

1. What did you really enjoy about learning physics last year?

2. What did you find most difficult?

3. What helps you learn best in the classroom – what do you like doing?

4. What stops you from learning in the classroom- what don't you like doing?

5. What would you like to achieve in physics this year?

6. Tell me a little bit about yourself-what are your hobbies



A LEVEL PHYSICS

Activity 2 Pythagoras- Calculator

Activity 1 Estimates- Non Calculator

By Rounding the numbers given calculate sensible estimate for the following sums. Remember you cannot round a number to zero

1 $\frac{24 \times 57}{77}$

2 $\frac{58.2 \times 28.4}{18.27}$

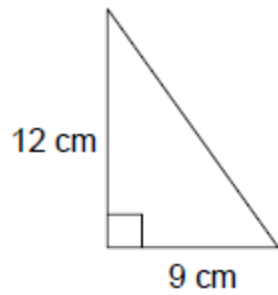
3 $\frac{615 \times 49}{15 \times 26}$

4 $\frac{313 \times 38}{11 \times 23}$

5 $\frac{0.62 \times 416}{34}$

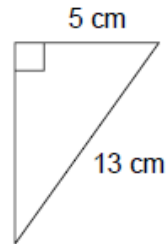


1 Find the missing side in each of the following right angle triangles. Give your answers to 2 dp where necessary.



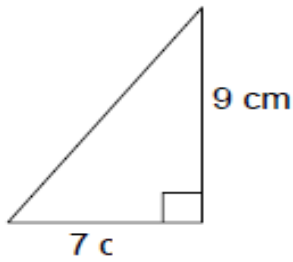
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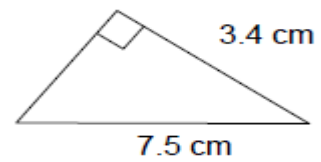
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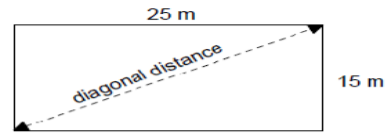
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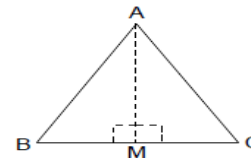
- 2 A rectangular school hall has a length of 25 metres and a width of 15 m. Calculate the diagonal distance across the hall.



- 3 A ladder of length 5 m rests against a wall. The bottom of the ladder is 1.2 m from the base of the wall. Calculate the vertical distance from the top of the ladder to the bottom of the wall.

- 4 Use Pythagoras' Theorem to find out if a triangle with sides 6 cm, 8 cm and 14 cm is a right angle triangle.

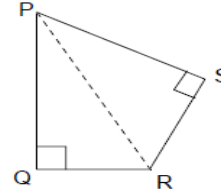
- 5 Triangle ABC is an isosceles triangle where AB and AC = 8 cm, and BC = 5 cm. M is the mid point of BC. Calculate AM, the height of the triangle.





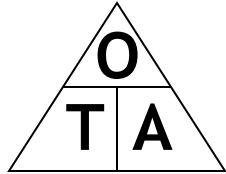
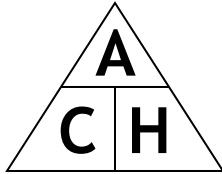
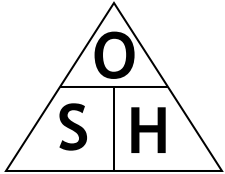
- 6 The diagram shows a park PQRS.
PQ is 48 m long.
QR is 20 m long.
RS is 36 m long.
There is a path, PR, running across the park.

- (i) Calculate the length of the path, PR.
(ii) Calculate the side of the park, PS.

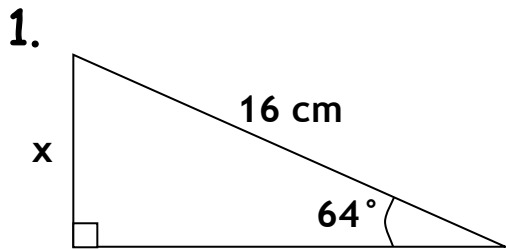


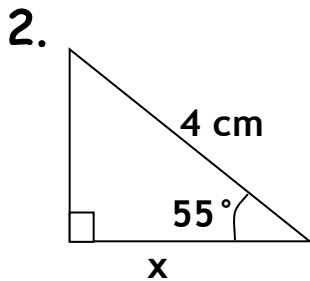


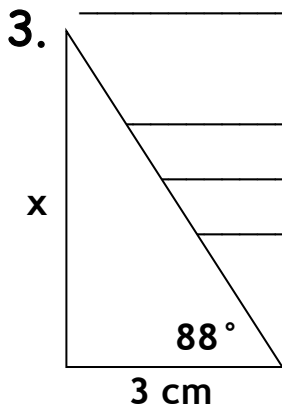
Activity 3 Trigonometry- Calculator



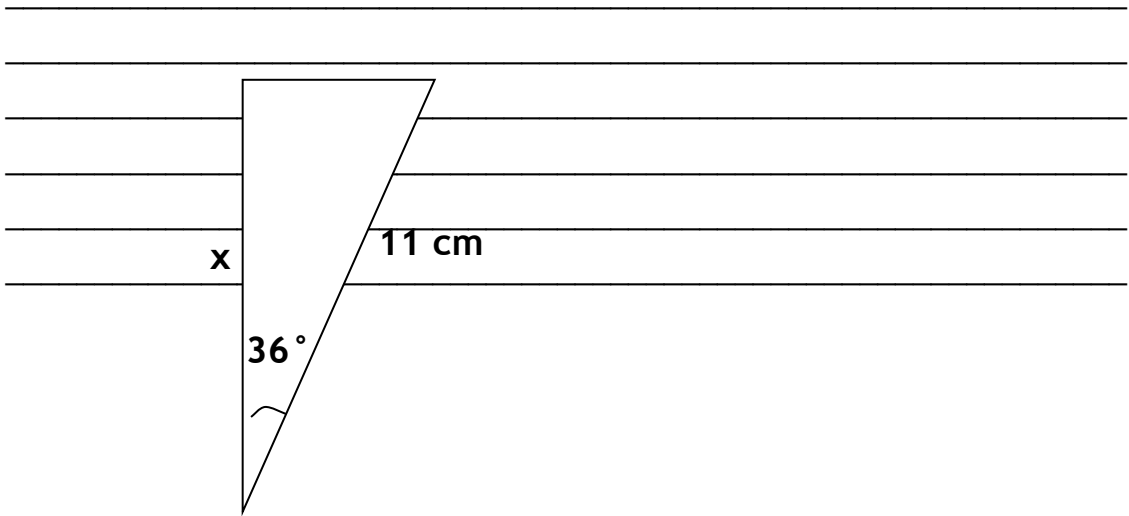
Use the triangles to find your missing side!



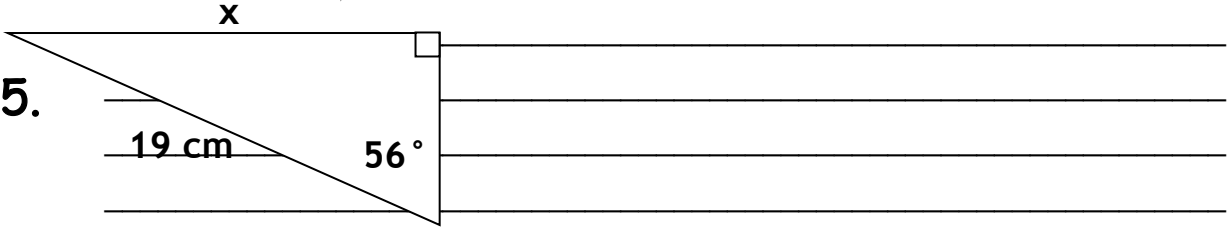




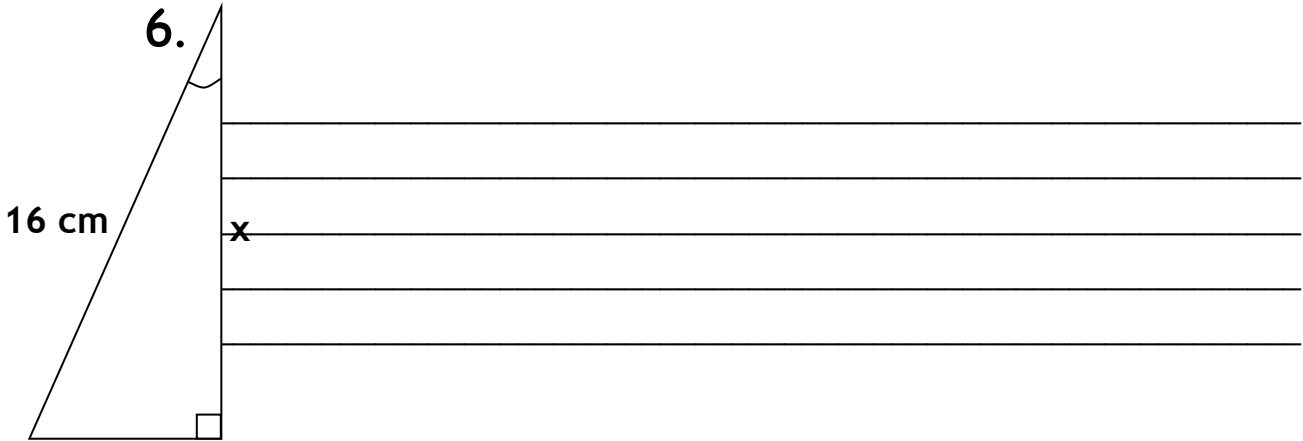
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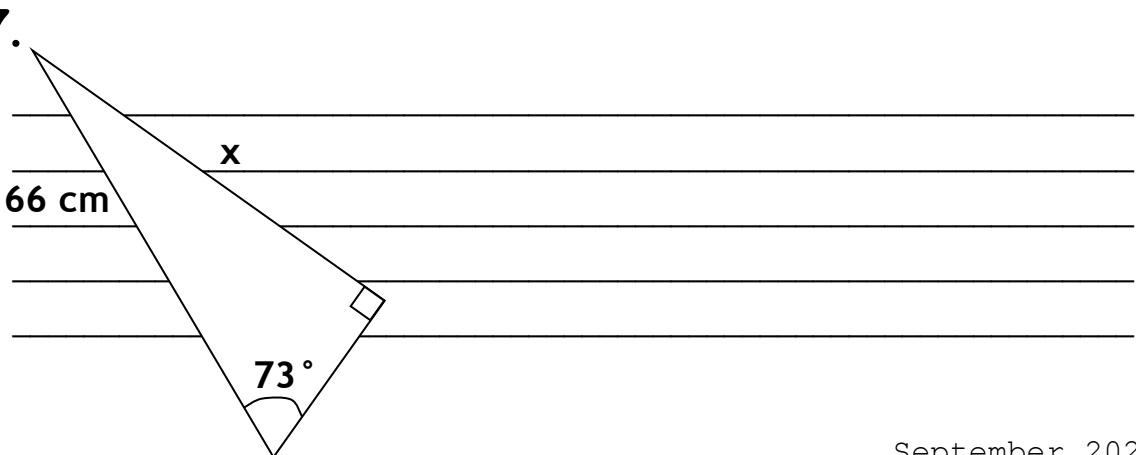
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6.



7.





Activity 4 Trigonometry in context- Calculator

1. A mountain railway climbs a mountain on a steady incline of track 4 km long. If the mountain is 1.4 km high, calculate the angle of incline to the nearest degree.

2. A cone has a slant height of 9.5 cm rising at an angle of 67° to the horizontal table on which it is standing. Find the vertical height of the cone to 3 sig fig.

3. A step-ladder has both legs 2.4 m long opened and inclined at 70° to the horizontal. Calculate to the nearest cm the distance between the two feet of the ladder.

4. A vertical cliff behind a house rises 35 m. If the foot of the cliff is 80 m away, what is the angle of elevation of the top of it from the house?

5. A rectangle has sides 16cm and 12cm long. Calculate the angle between the longest sides.



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6. A ladder 8m long leans against a vertical wall so that its angle with the ground is 61° . Find how far up the wall the ladder reaches.

7. A kite is flying at the end of 42m of string. If the string rises at an angle of 49° , how far above the ground is the kite?

8. A square has a diagonal 25cm long. Calculate the length of the side of the square.



Activity 5 Definitions

1) Using the internet or reference books define the meaning of the following terms which will be used in AS level Physics. Ensure you are able to verbally give these definitions as well.

Frequency

Wavelength

Wave Speed

Refraction

Reflection

Diffraction

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Current

Voltage

Charge

Resistance



Activity 6 Standard Form & prefixes

2 Standard form is the usual way that numerical answers are presented (e.g. 10^4 , 10^{-19} etc). Make sure that you can manipulate these when multiplying and dividing.

Try these $5 \times 10^6 \times 4.2 \times 10^2 =$

$4.3 \times 10^{-9} / 2.1 \times 10^{-4} =$

$2.4 \times 10^{-12} / 1.2 \times 10^{14} =$

$6 \times 10^{12} \times 3 \times 10^{-13} =$

3 Often in the course you will come across prefix letters in front of a unit eg **km** where **k** is 1000 (10^3) and **m** is in metres.

Fill in the missing blanks in the table, you may have to search on-line for some of the words to describe the base 10 prefix

Name	symbol	Base 10 value	Number
		10^6	
		10^9	
		10^{-9}	
pico	p		
micro	μ		
kilo	k		
centi			
			1,000,000,000,000
			0.001
femto			
		10^{15}	
			0.1
nano			



Do basic reading and note taking around the areas of the AS course listed below, noting the equations that will be used in your first study unit. Complete the numerical answers to the equations.

4 a **Resistance = Voltage / Current**

$$R = V / I$$

Work out the missing voltages, currents and resistances

Voltage (V)	Current (A)	Resistance (Ω)
6	3	
8	2	
9	3	
2.3	4.5	
100	3.4mA	
	0.5	9
	0.25	12
	2mA	1.5k
4		8
400k		16k
230		22
20mV		1.2

Further voltage current & resistance questions

b) A stereo system has a supply voltage of 120V

i) What is the resistance of the stereo if there is a current of 5A through it?



- ii) What current flows through it if it was connected to mains voltage? Give your answer to 1 dp.

- iii) Bruce powers his stereo from a 6V battery. What current now flows through the stereo?

- iv) What piece of equipment would be needed to maintain the correct current through the stereo so that no damage would occur?

- c) A lawnmower has a resistance of 18Ω resistance.

- i) What current (to 1dp) flows through the machine if runs off a 230v supply?

- ii) If the lawnmower is unplugged and run off a 30V battery, what current would flow?



iii) What battery voltage would allow a 1.5A current to flow?

iv) Another lawnmower runs off the mains and allows a current of 6500mA to flow. What is the resistance to 1dp

5 Electrical power = voltage X current

a) Find the missing values in the table

Power (W)	Voltage (V)	Current (A)
	6	3
	8	2
	9	3
	12	1.4
10		2
5		2
10kW		200
225		6
10k	200	
14k	7	
25	2	
55	0.5	

b) A hairdryer is plugged into the mains (230V)

i) Work out the power rating if 6A flows through the circuit



ii) Work out the power rating if 4.6A flows through the circuit.

iii) Work out the current that flows through the hairdryer if the voltage is 30V and the power rating is 300W.

iv) Another hairdryer is rated at 120V and 1.4kW. Which fuse should be fitted to the hairdryer 5, 10 or 13A?

c) A treadmill has a power rating of 1.5kW.

i) If a current of 10A flows what is the voltage rating of the treadmill?

ii) What voltage would be across the treadmill if the current were 12A?

iii) What voltage would be across it if the current were 6A?



- iv) Which fuse would be needed if the voltage were 600V – 2A, 3A or 5A?

6 Waves

Using the two equations $f = 1/T$ and $v = f \times \lambda$

Where f = frequency in Hz

T = time period in seconds (s)

v = wave speed in m/s (ms^{-1})

λ = wavelength in metres (m)

- a) Work out the frequency for waves with these time periods

- i) 10s

- ii) 0.2s

- iii) 0.01s

- iv) 5ms



b) Find the time period for these waves of the following frequencies

i) 250Hz

ii) 2×10^{-3} Hz

iii) 1000Hz

d) These waves have a frequency of 10Hz. Find the wavelength if they have the following velocities.

i) 3m/s

ii) 2500m/s

iii) 100cm/s

iv) 3×10^8 m/s

e) Find the velocity of the waves with these time periods and wavelengths

	Time period	Wavelength	Velocity
Wave 1	10s	20m	
Wave 2	5s	12m	
Wave 3	1min	15m	