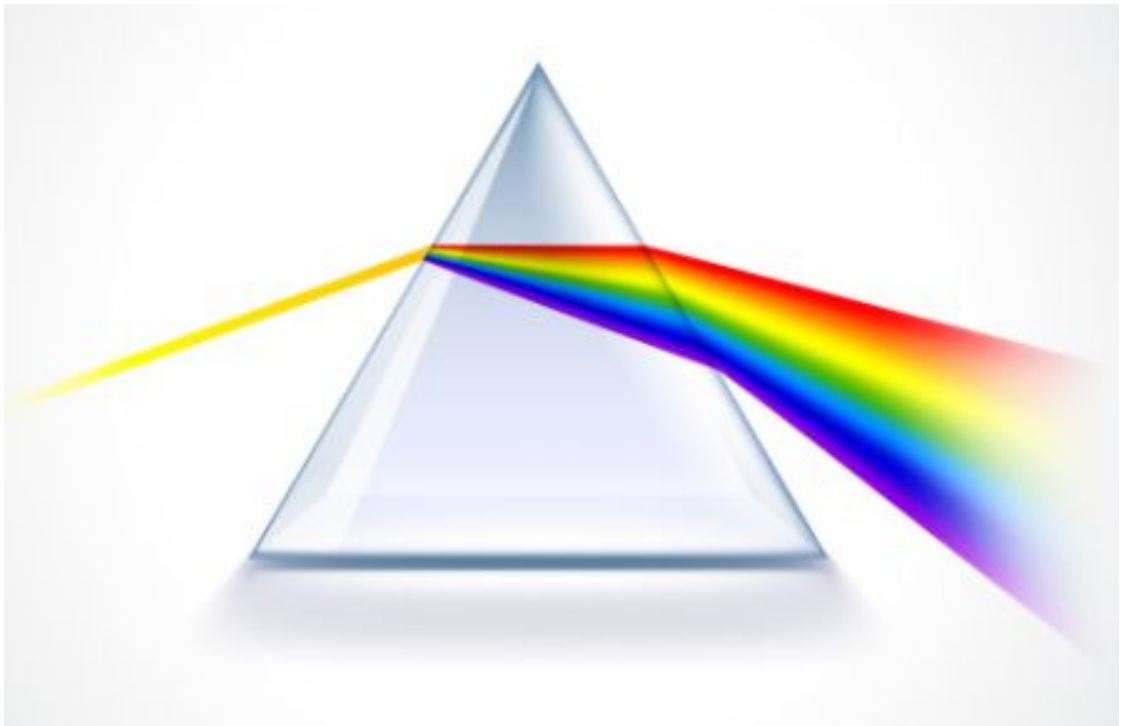
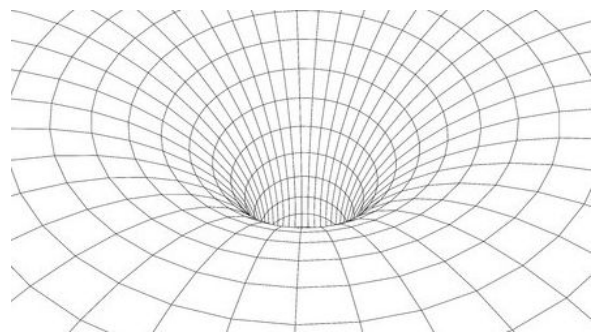


**Physics A-Level  
Year 11  
Transition  
Project 2020**



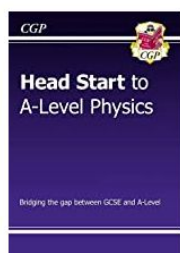
# There are three parts to the transition project.....

1. Learning material for a test on your first Physics lesson in Y12 (based on material in the CGP Head Start book)
2. Completing some transition work based on maths skills required at A-Level.
3. Research an area of Physics of your choice and prepare a presentation to deliver to your classmates.



# 1. Learning material for a Head Start test

- In your first Physics lesson, you will be asked to complete a test based on the CGP Head Start book.
- You can order this book directly from CGP here:  
[https://www.amazon.co.uk/Head-Start-level-Physics-Level/dp/1782942815/ref=sr\\_1\\_1?crid=3C0ONEKP84IU8&dchild=1&keywords=cgp+head+start+to+a+level+physics&qid=1588784722&srefix=CGP+Head+start%2Caps%2C153&sr=8-1](https://www.amazon.co.uk/Head-Start-level-Physics-Level/dp/1782942815/ref=sr_1_1?crid=3C0ONEKP84IU8&dchild=1&keywords=cgp+head+start+to+a+level+physics&qid=1588784722&srefix=CGP+Head+start%2Caps%2C153&sr=8-1)
- It's also available from Amazon
- And if you have a Kindle, you can download it for free



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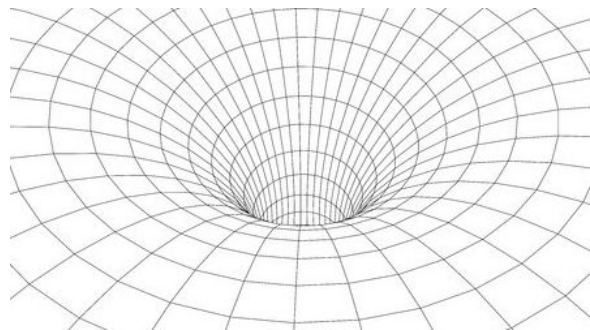
- You need to learn the information in the book as the test is based on it.
- You need a pass mark of 60%.

## 2. Maths Skills

- Complete the practice questions on the next few pages.
- They are linked to the maths skills you will need to complete your A-Level Physics course.

### **Contents:**

- Conversions
- Trigonometry
- Area
- Volume
- Calculating mean and range
- Plotting scatter graphs
- Linear equations
- Rearranging equations



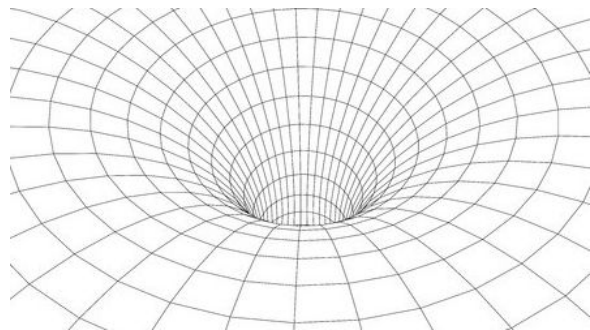
# Conversions

Convert the following:

- 1) 1 g = \_\_\_\_\_ kg
- 2) 4 kg = \_\_\_\_\_ g
- 3) 0.54 km = \_\_\_\_\_ m
- 4) 10 mJ = \_\_\_\_\_ J
- 5) 45 mN = \_\_\_\_\_ N
- 6) 1.2 MHz = \_\_\_\_\_ Hz
- 7) 5  $\mu\text{m}$  = \_\_\_\_\_ m
- 8) 128  $\mu\text{m}$  = \_\_\_\_\_ mm
- 9) 860 nm = \_\_\_\_\_ m
- 10) 0.000165 m = \_\_\_\_\_ nm
- 11) 0.0065 MHz = \_\_\_\_\_ Hz
- 12) 18 pJ = \_\_\_\_\_ J

Convert the following into standard index form:

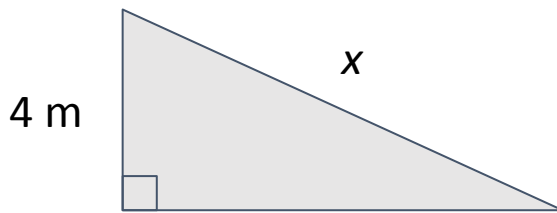
- 1) 18 J = \_\_\_\_\_ J
- 2) 135 m = \_\_\_\_\_ m
- 3) 1,875 N = \_\_\_\_\_ N
- 4) 0.12 J = \_\_\_\_\_ J
- 5) 0.0098 m = \_\_\_\_\_ m
- 6) 2.2 KJ = \_\_\_\_\_ J
- 7) 850 mHz = \_\_\_\_\_ Hz
- 8) 1.5 MJ = \_\_\_\_\_ J
- 9) 450 nm = \_\_\_\_\_ m
- 10) 45  $\mu\text{Hz}$  = \_\_\_\_\_ Hz



# Trigonometry

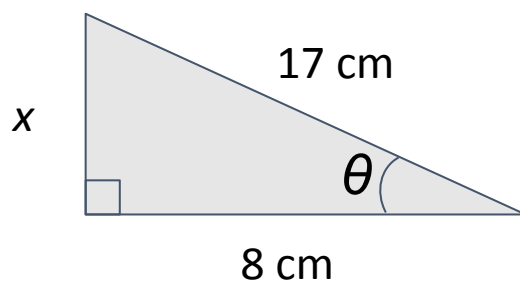
Show your full working out:

1) Look at this triangle:



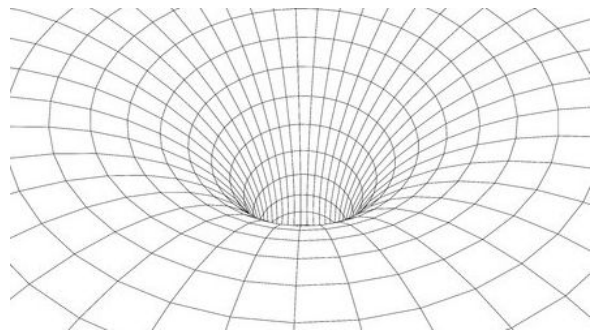
Calculate value  $x$ :

2) Look at this triangle:



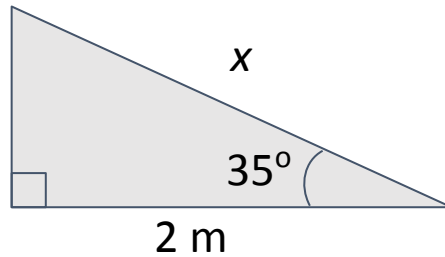
Calculate the value  $x$ :

Calculate the angle  $\theta$ :



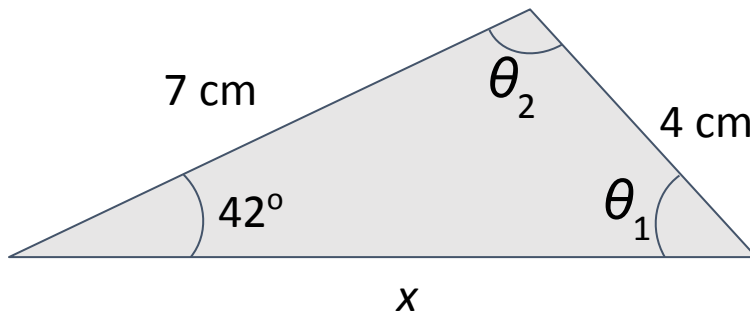
# Trigonometry Cont.

1) Look at this triangle:

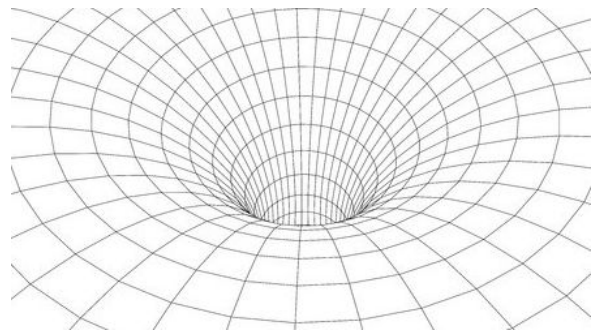


Calculate value  $x$ :

2) Look at this triangle:

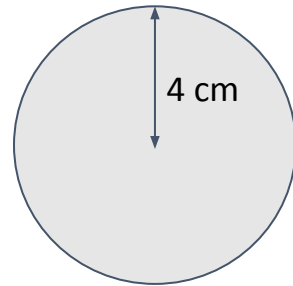
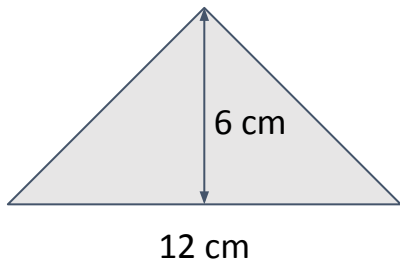


Calculate the values  $x$ ,  $\theta_1$  and  $\theta_2$ :

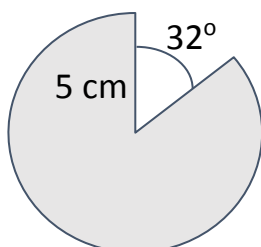
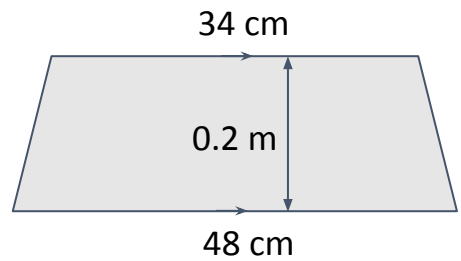
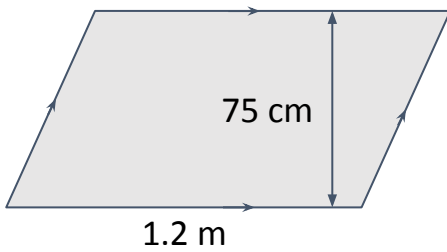
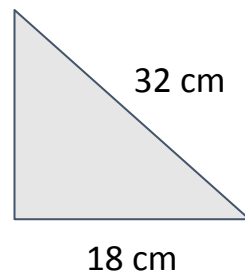
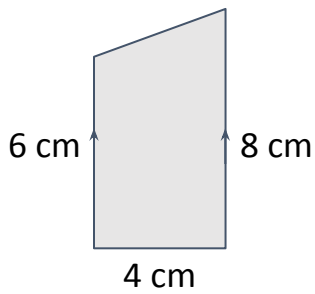


# Area

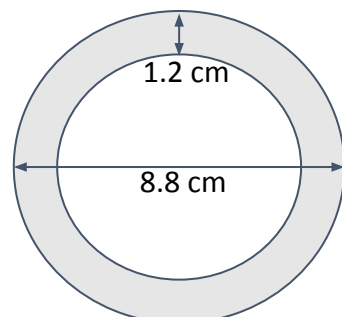
Find the area of the following:



*Assume perfect circle*



*Assume perfect circle*

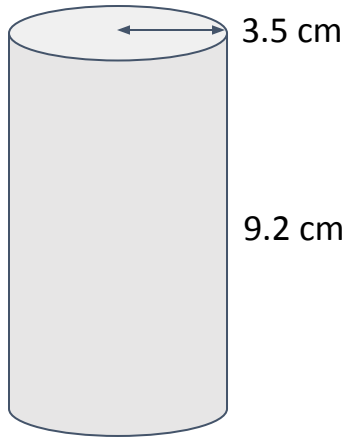


*Assume perfect circle*

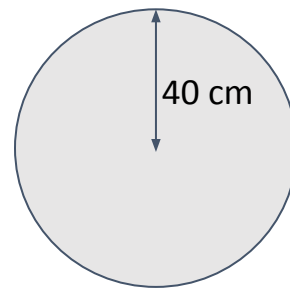


# Volume

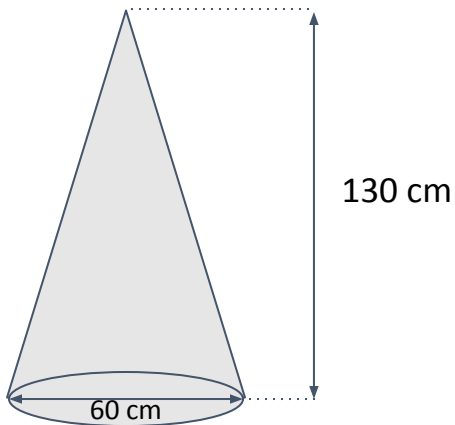
1) Find the area of the following:



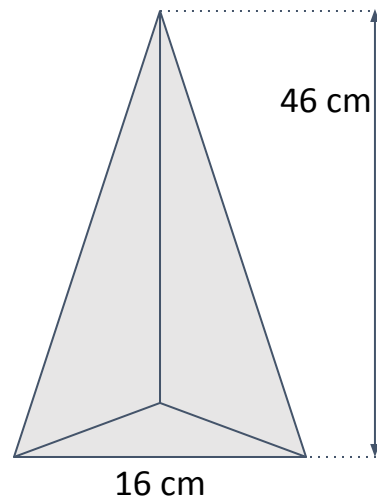
*Assume perfect circle*



*Assume perfect sphere*



*Assume perfect circular base*



*Assume base is equilateral triangle*

2) Convert your volumes above into  $\text{m}^3$ .

# Calculating Mean and Range

1) Calculate the mean and range of the following values:

a) 2, 6, 5, 4, 8, 7, 9, 8, 7, 4, 5, 2

b) 167, 145, 123, 189, 175

2) Calculate the mean and range of the following values in the tables. Exclude any anomalous data:

Height / m	Time taken 1 / s	Time taken 2 / s	Time taken 3 / s	Mean Time Taken / s	Range / s
0.5	0.22	0.24	0.22		
1.0	0.46	0.42	0.45		
1.5	0.69	0.61	0.68		
2.0	0.85	0.88	0.86		
2.5	1.02	1.12	1.04		

# Plotting Scatter Graphs

3) Plot the above data as a suitable scatter graph.

Ensure:

- A suitable scale and graph size
- All axis are labelled and a title is present
- Line of best fit is accurate



# Linear Equations

Linear equations follow the pattern  $y = mx + c$

Plot the following three graphs:

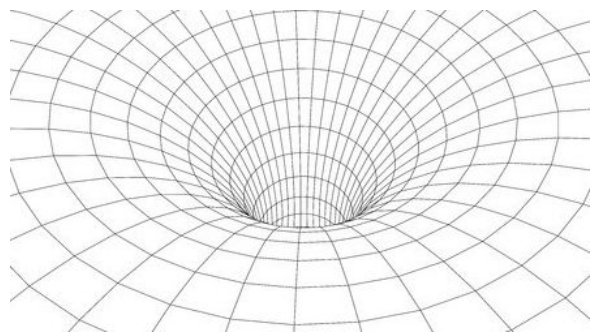
1)  $y = 2x + 4$

2)  $y = 4x - 3$

3)  $y = -3x + 6$

Ensure:

- A suitable scale and graph size
- All axis are labelled and a title is present















# Rearranging Equations

Show your full working out:

1)  $a = b + c$

Rearrange to find  $b$ :

2)  $a = bc + d$

Rearrange to find  $b$ :

Rearrange to find  $d$ :

3)  $a^2 = bc$

Rearrange to find  $a$ :

Rearrange to find  $c$ :

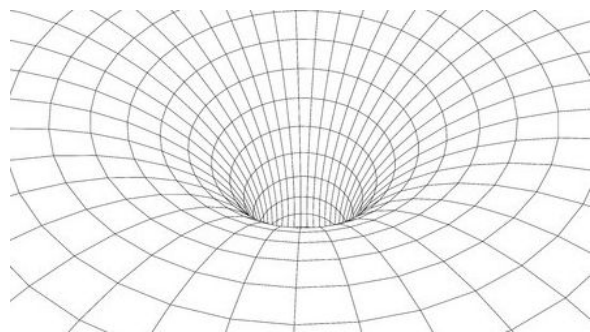
4)  $a = \frac{1}{2} bc$

Rearrange to find  $b$ :

5)  $a = \sqrt{b} + c$

Rearrange to find  $b$ :

Rearrange to find  $c$ :





# Rearranging Equations Cont.

1)  $ab = b + c$

Rearrange to find  $c$ :

2)  $ac = bc + d$

Rearrange to find  $b$ :

Rearrange to find  $d$ :

3)  $a^2 = bc + d$

Rearrange to find  $c$ :

Rearrange to find  $d$ :

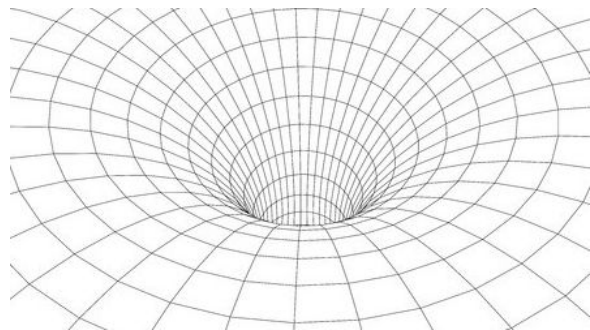
4)  $ad = \frac{1}{bc}$

Rearrange to find  $bc$ :

Rearrange to find  $b$ :

5)  $ab = \sqrt{bc}$

Rearrange to find  $c$ :



# Rearranging Equations Cont.

$$1) \quad a = \frac{b}{c} + d$$

Rearrange to find  $b$ :

Rearrange to find  $c$ :

Rearrange to find  $d$ :

$$2) \quad \frac{a}{b} = \frac{a}{c}$$

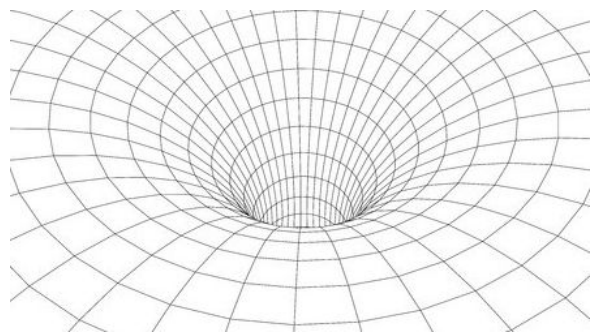
Rearrange to find  $b$ :

$$3) \quad a = \sqrt{\frac{b}{c}} + de$$

Rearrange to find  $b$ :

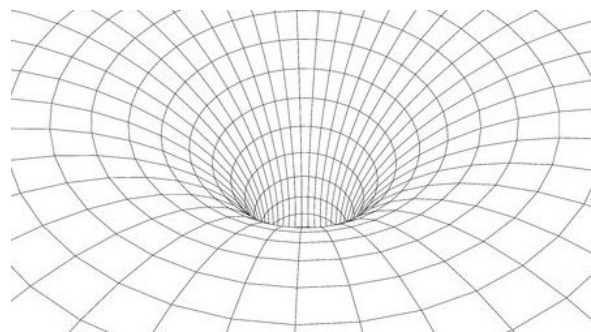
Rearrange to find  $c$ :

Rearrange to find  $d$ :



# 3. Research and presentation on an area of Physics of your choice.

- Your teachers are very interested to know why you have chosen to study Physics at A-Level.
- Choose an area of Physics that interests you. There are lots of examples, with resources to start you off, on the following slides.
- Research your topic carefully.
- Present your research in the form of a presentation (Powerpoint or otherwise) that you can deliver to your classmates.
- Your final slide should include references for the sources of your research (use the Harvard or Vancouver method to reference your sources).



# Some topics that may inspire you...

Here are some pointer questions that you could use to frame a research project. You don't need to answer the question but you could build a project around a particular aspect of it, or even other similar topics.

## Quantum Physics:

- What are sub-atomic particles made of?
- What is the aim of the Large Hadron Collider?
- What is gravity?

## Engineering:

- The physics of a suspension bridge/building/vehicles
- Can we build large buildings in earthquake-prone areas?
- What ways can nature improve technology?

## Space Physics:

- What is at the end of the universe?
- Can we ever achieve light speed?
- What happened before the big bang?
- Is there life elsewhere in the solar system?

# Some topics that may inspire you...

## Electricity:

- Can we ever eliminate resistance?
- What ways can we produce carbon-neutral energy?
- How can we produce longer-lasting batteries?

## Nuclear Physics:

- Is fission/fusion the future of clean energy?
- Where did the antimatter go?

You can find so many other topics that you may want to use at this website:

[https://en.wikipedia.org/wiki/List\\_of\\_unsolved\\_problems\\_in\\_physics](https://en.wikipedia.org/wiki/List_of_unsolved_problems_in_physics)

