Huxlow & Rushden Academy
SIXTH FORM
One Trust, Two Schools, One Vision of Excellence

# Physics A Level

Transition Task

Prepared by: T Brown

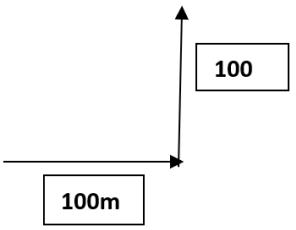
## Retrieval questions

You will need to be confident in the use of maths. Please complete the following questions:

### **Task 1:** Use Pythagoras's theorem to solve the following problems:

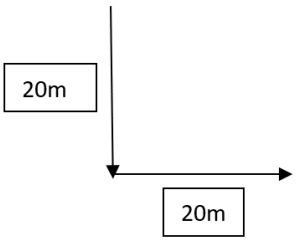
(Pythaogoras's Theorem) $a^2 = b^2 + c^2$

1. A boat sails east for 100m and then north for 100m. Calculate the displacement of the boat.



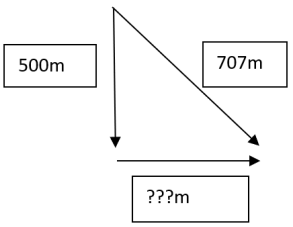

**Answer:**

2. A cat walks 20m to the south and then 20m to the east. Calculate the displacement of the cat.




**Answer:**

3. A car travelled 500m south and after travelling east, ended up with a south-east displacement of 707m. How far east did the car travel?




**Answer:**

Huxlow Academy
Finedon Road
Irthlingborough
Northamptonshire
NN9 5TY

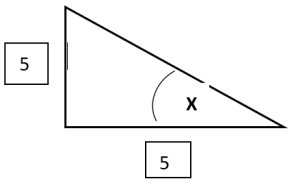
TOVE LEARNING TRUST

Rushden Academy
Hayway
Rushden
Northamptonshire
NN10 6AG

## Task 2: Using Trigonometry

Use your knowledge of trigonometry to decide which rule needs to be used to calculate the unknown value from a right-angle triangle. Then calculate the unknown value.

Example:




This triangle possesses value for the opposite and adjacent.

We can then use soh cah toa to choose to use the sine, cosine or tangent rule to calculate the unknown angle X.

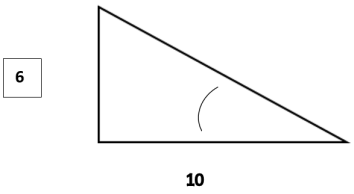
As the opposite and adjacent is known, we use the tangent rule, so:

Tan X = Opposite
Adjacent

Tan X = 5 = 1 So, X = Tan-1 (1) = 450
5

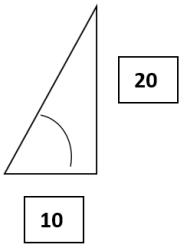
Now you try:

4. Find the unknown angle Y:



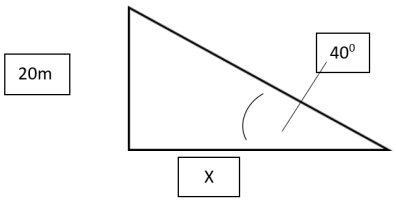

**Answer:**

5. Find the unknown angle Z:



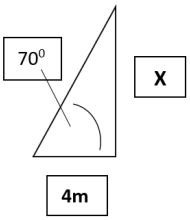

**Answer:**

6. Find the unknown distance:



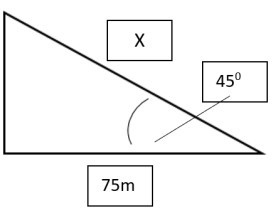

**Answer:**

7. Find the unknown distance:



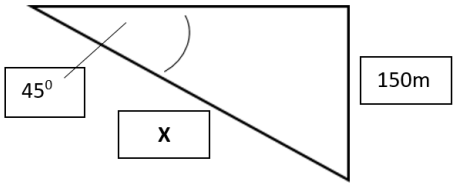

**Answer:**

8. Find the unknown distance:




**Answer:**

9. Find the missing distance:




**Answer:**

## Task 3: Rearranging Equations

10. Rearrange the following equation to make each quantity the subject of the equation:

*Energy transferred = mass x specific heat capacity x change in temperature*

a) Mass =

b) Specific heat capacity =

c) Change in temperature =

11. Rearrange the following equation to make each quantity the subject of the equation:

*Elastic potential energy = 0.5 x spring constant x extension2*

a) Spring constant =

b) Extension =

12. Rearrange the following equation to make each quantity the subject of the equation:

**Potential difference across primary coil = Potential difference across secondary coil**

X Current in primary coil X Current in secondary coil

a) Potential difference across primary coil =

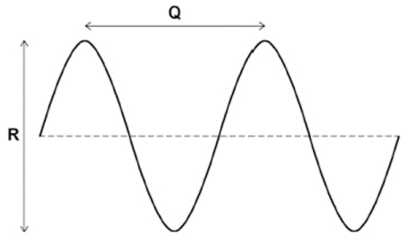
b) Current in primary coil =

c) Potential difference across secondary coil =

d) Current in secondary coil =

### Task 4: Transition Practice Questions

1. Electromagnetic waves are transverse. The figure below represents a transverse wave.




a. Which of the following gives the wavelength of the transverse wave?
Tick (✓) one box.

wavelength = $\frac{Q}{2}$ ☐

wavelength = Q ☐

wavelength = 2 Q ☐

b. Which of the following gives the amplitude of the transverse wave?
Tick (✓) one box.

amplitude = $\frac{R}{2}$ ☐

amplitude = R ☐

amplitude = 2 R ☐

c. Microwaves are electromagnetic waves used for mobile phone communications. Which other type of electromagnetic wave is also used for communications?
Tick (✓) one box.

Radio waves ☐

Ultraviolet ☐

X-rays ☐

d. Microwaves from a mobile phone take 0.000 009 s to reach a mobile phone mast.
*speed of microwaves = 300 000 000 m/s*
Calculate the distance between the mobile phone and the mobile phone mast.
Use the equation: distance = speed × time

_____

_____

_____

Distance = _____ m

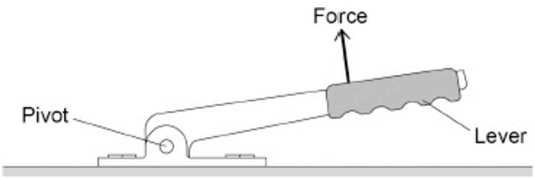
e. Mobile phone communications is only one of the uses for microwaves.
Give **one** other use of microwaves.

_____

_____

2. Some cars have a lever that is used to apply the handbrake.
Figure 1 shows the handbrake lever in a car.

**Figure 1**



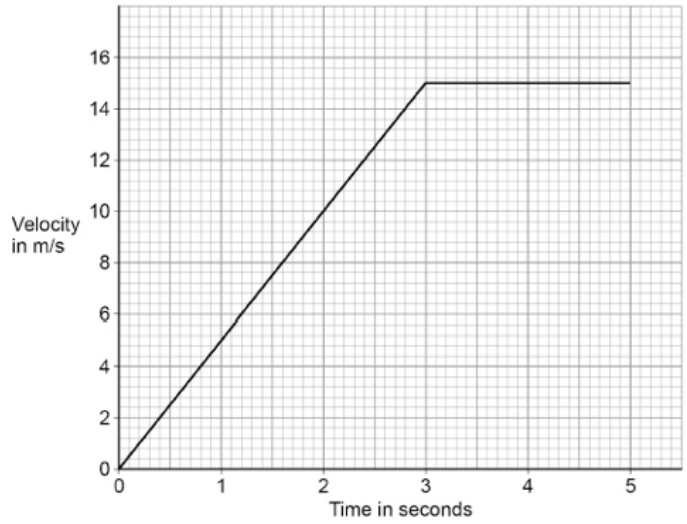

a. The driver applies the force shown in **Figure 1**. The force produces a moment about the pivot.
How could the driver increase the moment about the pivot without increasing the size of the force?

_____

_____

The driver releases the handbrake.
Figure 2 shows how the velocity of the car changes during the first 5 seconds of a journey.

**Figure 2**




b. After 3 seconds, the momentum of the car is 24 000 kg m/s.
Calculate the mass of the car.

_____

_____

_____

_____

_____

_____

Mass = _____ kg

c. Determine the distance travelled by the car during the first 5 seconds of the journey.
Use Figure 2.

_____

_____

_____

_____

_____

Distance travelled by the car = _____ m

d. In an emergency the driver needs to apply the brakes suddenly to stop the car quickly.
The driver of the car is distracted.
Explain why the distraction will increase the stopping distance.

_____

_____

_____

_____

_____

_____

e. Explain why the temperature of the brakes increases as they are used.

_____

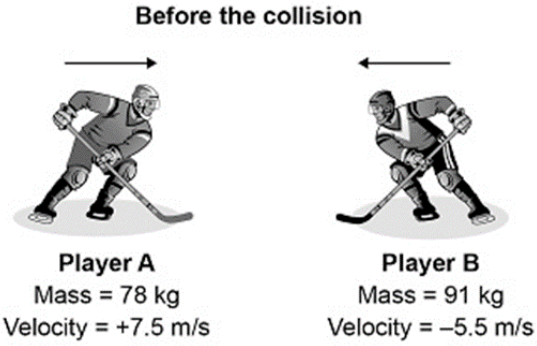
_____

_____

_____

_____

3. The image below shows two ice hockey players moving towards each other.
They collide and then move off together.




During the collision, the total momentum of the players is conserved.
a. What is meant by 'momentum is conserved'?

_____

_____

b. Immediately after the collision the two players move together to the right.
Calculate the velocity of the two players immediately after the collision.

_____

_____

_____

_____

_____

_____

Velocity = _____ m/s

c. The ice hockey players wear protective pads filled with foam.
Explain how the protective pads help to reduce injury when the players collide.

_____

_____

_____

_____

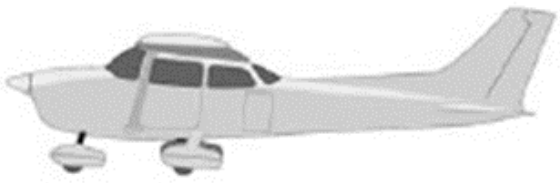
_____

_____

4.

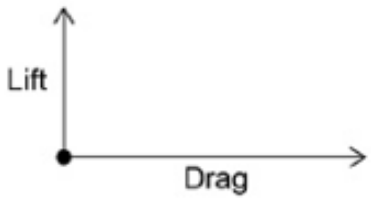
(a) Figure 1 shows an aircraft flying at a constant velocity and at a constant height above the ground.

**Figure 1**



Complete the free body diagram in Figure 2 to show the other two forces acting on the aircraft.

**Figure 2**




b. A small aircraft accelerated down a runway at 4.0 m/s2
The aircraft started from rest and reached a speed of 34 m/s just before take-off.
Calculate the distance the aircraft travelled while accelerating.

Give your answer to 2 significant figures.

_____

_____

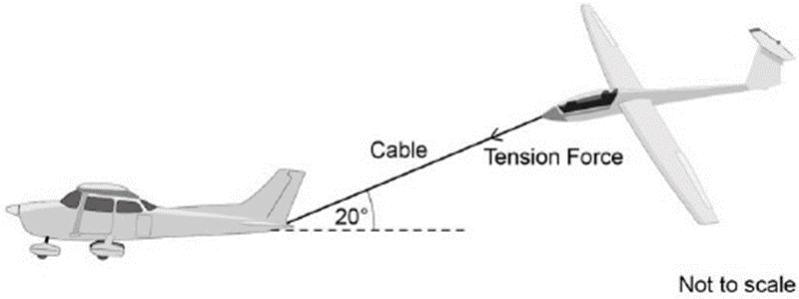
_____

_____

Distance = _____ m

c. Figure 3 shows the small aircraft being used to tow a glider.

**Figure 3**




Not to scale

The tension force in the cable can be resolved into a horizontal component and a vertical component.
The tension in the cable is 2000 N
The cable makes an angle of 20° with the horizontal.
Draw a vector diagram to determine the magnitude of the two components of the tension force in the cable.

Magnitude of the horizontal component = _____ N

Magnitude of the vertical component = _____ N