Brixham College: Year 11 PHYSICS

Lesson	Summary of content	Date
1 and 2	Force basics Read pages 127 - 128 physics 9- 1 CGP book Make notes on vectors and scalar quantities, and contact and non contact forces Answer Q page 128.	**September**
3	Mass and weight. Read pages 129 - 130 physics 9- 1 CGP book. Make notes on weight and mass Learn this equation off by heart. Recall and apply them. Answer Q weight = mass × gravitational field strength $[W = m g]$	
4 **WORKSHEET 1**	Resultant forces Read page 131 physics 9- 1 CGP book Make notes from page 130 and copy the example. Complete the Q from resultant forces worksheet 1. HT only Read pages 132 – 133 – Make notes on - Free body diagrams. Use of vector diagrams to determine the resultant of 2 forces, to include magnitude and direction.	
5	Work done. Read pages 135 – 136 9-1 CGP book. Make notes and answer Q. Learn this equation off by heart. Recall and apply them. Know that 1J = 1 Nm Students should be able to convert between newton-metres and joules work done = force × distance (moved along the line of action of the force) $[W = F s]$	
6	Forces and elasticity. Read pages 139 – 140 9-1 CGP book. Make notes and copy examples Learn this equation off by heart. Recall and apply $force = spring\ constant \times extension$ $[F = k e]$	
7	Elastic potential energy store Read page 141 9-1 CGP book. Make notes and copy examples $elastic\ potential\ energy = 0.5 \times spring\ constant \times (extension)^2$ $[E_e = \frac{1}{2} k e^2]$ Learn this equation off by heart. Recall and apply. Answer Q page 142	

8 and 9 **WORKSHEET 2**	**Required Prac: investigate the relationship between force and extension for a spring.** Lesson 8: Read page 143 9-1 CGP book. Draw and label the diagram and write a detailed method STRETCH: Name the independent, dependent and control variables Lesson 9: Copy and complete the table on worksheet 2 Draw a graph with force on the x axis and extension on the y axis Write a conclusion	**October**
10 + 11	Speed **Lesson 10:** Read page 147- 149 9-1 CGP book. Revise speed, velocity and acceleration. Make notes on the areas you don't know. Learn off by heart these speed values: walking- 1.5 m/s running- 3 m/s cycling- 6 m/s. speed of sound in air is 330 m/s HT: Motion in a circle **Lesson 11: Read page 148 – 149 from the section calculating speed** **Copy the example boxes and answer all the Q**	
12	Acceleration and uniform acceleration Read page 150 - 151 9-1 CGP book. Make notes and learn the equations off by heart. Answer Q. $acceleration = \frac{change\ in\ velocity}{time\ taken}$ $\left[a = \frac{\Delta v}{t} \right]$ The following equation applies to uniform acceleration: (final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance $\left[v^2 - u^2 = 2as \right]$ final velocity, v, in metres per second, m/s initial velocity, u, in metres per second, m/s acceleration, a, in metres per second squared, m/s^2 distance, s, in metres, m	
13	DT graphs. Read page 152 - 153 9-1 CGP book. Copy the example of a distance time graph page 153 and important points page 152 about DT graphs Answer Q page 154. HT only - drawing a tangent and measuring the gradient of a DT graph	
14	VT graphs. Read page 155 9-1 CGP book. Copy the example of a velocity time graph page 155 and important points about VT graphs Answer Q 1,2 and 3 page 158. HT = read and make notes from pages 156 – 157. Answer all Q	
15	Newton's 1st Law and give everyday examples.	**November**

	Read page 162 - 163 9-1 CGP book. Make notes and answer Q page 163.	
16	Newtons second Law. Read page 164 - 165 9-1 CGP book. Learn this equation off by heart. Recall and apply them $$resultant\ force = mass \times acceleration$$ $$F = m\,a$$ Answer Q page 166 HT / STRETCH - Inertia	
17 WORKSHEET 3	**Required Prac: acceleration** Read page 167 - 168 9-1 CGP book. Write a method and draw a diagram (figure 1) Copy and complete worksheet 3. Draw a line graph. Force on x axis and mean acceleration on y axis.	
18	Newton's 3rd Law Read page 169 - 170 9-1 CGP book. Make notes and answer Q STRETCH answer Q on page 173 - 175	
19 + 20	Revise stopping distances and factors that affect Read page 176 - 179 9-1 CGP book. Copy figure 1 – make notes. Answer Q	
21	Magnet basics Read page 216 - 217 9-1 CGP book. Make notes and answer Q	**December**
22	Electromagnets Read page 218 - 220 9-1 CGP book. Make notes on solenoids and uses of electromagnets and answer Q page 220	
23	Revision - Recap of learning so far and revision- Use the fold in half sheets to test yourself . LOOK, COVER and CHECK!! HT -The motor effect 221 – 228. Read and make notes. Answer Q.	

Worksheet 1: Resultant forces

A fisherman pulls a boat towards land. The forces acting on the boat are shown in **Diagram 1**.

The fisherman exerts a force of 300 N on the boat.
The sea exerts a resistive force of 250 N on the boat.

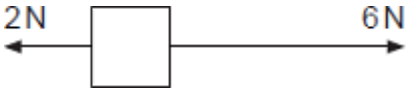
Diagram 1

1. Work out the resultant force

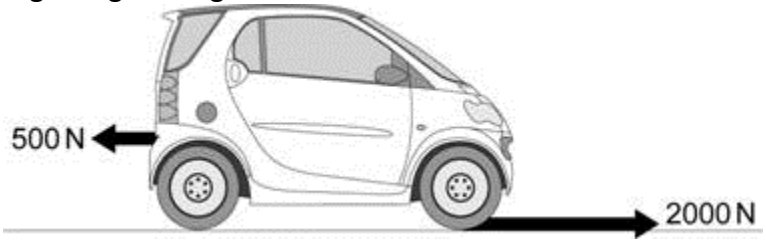
2. Describe the motion of the boat.

3. When the boat reaches land, the resistive force increases to 300 N. The fisherman continues to exert a force of 300 N. **Work out the resultant force.** Describe the motion of the boat.

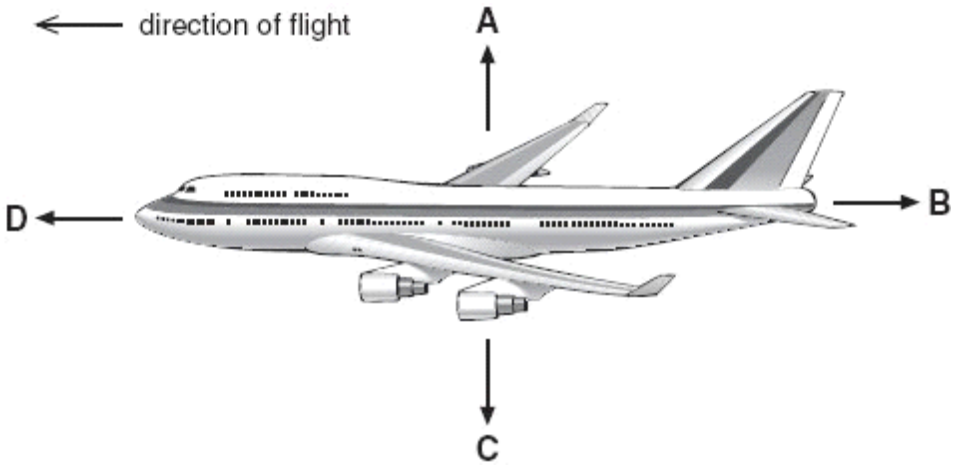
4. The diagram shows two forces acting on an object. What is the resultant force?



5. What is the resultant force acting on a car travelling along a straight road. Describe its motion.

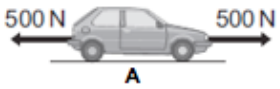


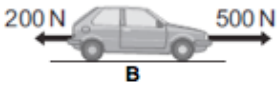
6. The diagram shows four forces acting on a plane in flight. **Name forces A, B and C.**

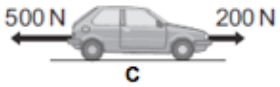


7. If the plane is flying at a constant height, which 2 forces must be balanced

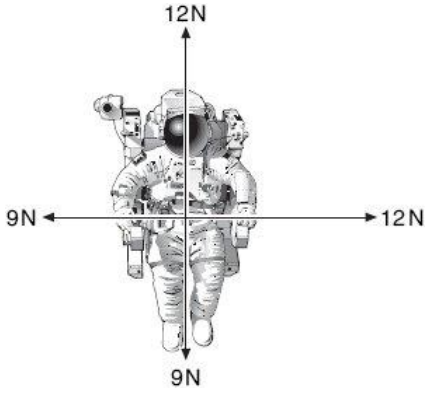
8. The diagrams, **A**, **B** and **C**, show the horizontal forces acting on a **moving** cars. Work out the resultant forces. Describe the motion of the car when the forces shown in the diagram act on it.



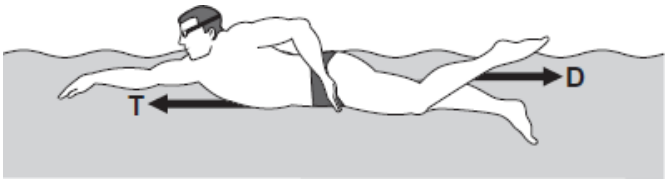




9. The drawing below shows the size and direction of four different forces acting on the astronaut. Draw an arrow on the diagram below to show the direction in which he will move.



10. The diagram shows the horizontal forces acting on a swimmer. The swimmer is moving at constant speed. Force **T** is 120 N. What is the size of force **D**?



11. By increasing force **T** to 140 N, the swimmer accelerates to a higher speed.

Calculate the size of the initial resultant force acting on the swimmer.

12. Even though the swimmer keeps the force **T** constant at 140 N, the resultant force on the swimmer decreases to zero.

Explain why.(3)

ANSWERS:

1. **50N**

2. **/ to the right / in the direction of the 300 N force**

accelerating

3. **resultant force is zero**

so boat continues in the same direction at the same speed

4. **4 N to the right**
5. **1500N to the right / forward**
6. **A = upthrust, B = air resistance and C = gravity**
7. **7A and C**
8. **A = 0 = constant speed**
   B = 300N accelerating forward

   C = 300N decelerating

9. **Up to the right**
10. **D = 120N**
11. **20N**
12. **A**s speed increases

    drag force / water resistance / friction / **D** increases

    until) **D** = 140 N or (until) **D** = **T**

Worksheet 2:Hookes Law

1.Complete the table by completing the extension of the spring.
HINT: Extension = length of spring – initial length of spring
2. Draw a graph
3. Write a conclusion

Force added to spring / N	Length of spring / mm	Extension /mm
0	25	
0.2	28	
0.4	31	
0.6	34	
0.8	37	
1.0	40	
1.2	43	
1.4	46	
1.6	49	
1.8	52	
2.0	55	

4) What relationship can be seen on the graph?

linear relationship non-linear relationship

5) Elastic objects have more potential energy when they are:

stretched squashed stretched or squashed

6) Forces are measured in:

Joules Newtons Hookes

7) How would you rearrange the Hooke's Law formula to calculate the spring constant?

k = f x e k = f ÷ e k = f + e

8) What would be the extension of the spring if a force of 3 N was applied to it?

40 mm 45 mm 60 mm

9) What is the spring constant an indicator of?

stiffness of the spring number of coils in the spring

length of the spring

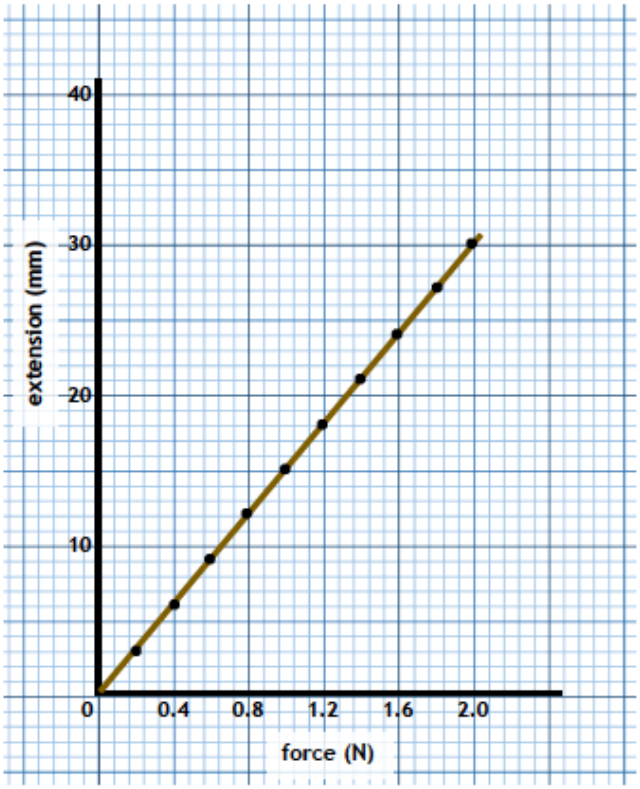
ANSWERS – worksheet 2

This activity would make an ideal homework or revision of Hooke's Law after students have carried out a similar investigation. It could also be used instead of the practical activity.

1)

force added to spring (N)	length of spring (mm)	extension (mm)
0	25	0
0.2	28	*3*
0.4	31	*6*
0.6	34	*9*
0.8	37	*12*
1.0	40	*15*
1.2	43	*18*
1.4	46	*21*
1.6	49	*24*
1.8	52	*27*
2.0	55	*30*

2)



3) From the results we can see that as the force applied to the spring increases the extension of the spring is increased. This is a linear relationship and the relationship is directly proportional. As the force doubles, the extension doubles. We can see this from the results as when the force applied is 0.2 N, the extension is 3 mm and when the force applied is 0.4 N the extension is 6 mm.

4) linear relationship

5) squashed

6) Newtons

7) k = F / e

8) 45 mm

9) the stiffness of the spring

Worksheet 3:

Acceleration required practical

Force (N)	**Run 1 acceleration $(m/s)^2$**	**Run 2 acceleration $(m/s)^2$**	**Run 3 acceleration $(m/s)^2$**	**Mean acceleration $(m/s)^2$**
0.98	0.22	0.27	0.37	
0.78	0.20	0.29	0.21	
0.59	0.26	0.11	0.17	
0.39	0.21	0.10	0.05	
0.20	0.04	0.06	0.11	