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SPECA

GCSE Combined Science (AQA Trilogy) · Physics

Forces: Interactions, Work Done and Elasticity, Tiered Worksheet

Section A: Foundation

Forces, weight, and resultant force

1) State the difference between a scalar quantity and a vector quantity, giving one example of each. **[2]**

2) Define a force, and give two examples of contact forces and two examples of non-contact forces. **[3]**

3) A skydiver falls through the air. Identify the pair of objects interacting to produce the force of air resistance on the skydiver. **[1]**

4) Calculate the weight of a rock of mass 15 kg on Earth, where the gravitational field strength is 10 N/kg. **[2]**

5) A moon has a gravitational field strength of 1.6 N/kg. An astronaut has a mass of 80 kg. Calculate the astronaut's weight on that moon. **[2]**

6) Explain why an object's weight can be treated as acting at a single point, and name that point. **[1]**

7) Two forces act on an object in a straight line: 30 N to the right and 12 N to the left. Calculate the resultant force, stating its direction. **[2]**

Work done and elasticity

8) A crane lifts a 200 N load a vertical distance of 5 m. Calculate the work done by the crane. **[2]**

9) State the equation linking work done, force, and distance, and state what 1 joule is equivalent to. **[2]**

10) Explain why work done against friction causes an object's temperature to rise. **[1]**

11) Explain the difference between elastic deformation and inelastic deformation. **[2]**

12) Explain why changing the shape of a stationary object (stretching, bending, or compressing it) requires more than one force to be applied. **[1]**

13) A spring has a spring constant of 40 N/m. Calculate the force needed to extend it by 0.15 m. **[2]**

14) A force of 6 N compresses a spring by 0.03 m. Calculate the spring constant. **[2]**

15) Calculate the elastic potential energy stored in a spring with a spring constant of 25 N/m, extended by 0.2 m, assuming the limit of proportionality is not exceeded. **[3]**

16) Explain what happens to the work done stretching a spring, provided the spring is not inelastically deformed. **[1]**

Section B: Higher (in addition to Section A)

Free body diagrams and resolving forces

17) A box on a table has three forces acting on it: 20 N downward (weight), 20 N upward (normal contact force), and 8 N to the right (applied push), balanced by 8 N of friction to the

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left. Draw a free body diagram in words (list each force with its direction) and state the resultant force on the box. [3]

18) A single force of 100 N acts at 30° above the horizontal. Using a scale diagram, resolve this force into a horizontal component and a vertical component, and state the scale you used. [3]

19) Explain what it means for an object to be in equilibrium, and describe how a vector diagram can be used to check whether a set of forces is in equilibrium. [2]

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