Resultant forces

Name _____ Date _____

Key ideas

A force has a magnitude and direction. Pick a positive direction before adding or subtracting forces. Newton’s second law links the resultant force, mass and acceleration by F = ma.

Worked examples

A 15 N push acts right and a 6 N force acts left. Find the resultant.

Take right as positive: 15 − 6 = 9 N to the right.

A 20 kg object experiences a resultant force of 50 N. Find its acceleration.

Rearrange F = ma to a = F/m. The acceleration is 50 ÷ 20 = 2.5 m/s² in the direction of the resultant.

Practice questions

Show your reasoning. Each question is worth 2 marks.

1. Two forces of 7 N and 9 N act east. State the resultant with its direction.

2. A 12 N force acts left and 5 N acts right. Calculate the resultant.

3. Two 18 N forces act in opposite directions. Find the resultant and explain your answer.

4. Find the resultant force required to accelerate a 6 kg crate at 2.5 m/s².

5. A 9 N resultant acts on a 3 kg trolley. Find its acceleration.

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6. A driver pushes a crate east with 60 N and friction acts west with 20 N. Find the acceleration if the mass is 10 kg.

7. A 20 N resultant force produces an acceleration of 0.8 m/s². Calculate the mass.

8. A 9 kg trolley accelerates right at 2 m/s² when pushed right by 26 N. Calculate the opposing resistance.

9. A cyclist moves east at steady velocity while driving force is 130 N. Find the total resistance and explain.

10. A 3 kg box has a 30 N force to the right and a 12 N force to the left. A second leftward force is added so it accelerates left at 2 m/s². Find that added force.