# Year 9 Science: Net force, balanced and unbalanced forces, and pressure

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

## Practice

1. A boat's engine pushes forward with 800 N. Water drag is 650 N backward. Find the net force and say what the boat does.

2. A cyclist moves at a steady 20 km/h in a straight line. What is the net force on her, and how do you know?

3. In a test of how the mass of a trolley affects its speed down a ramp, name the independent, dependent and two controlled variables.

4. Trial times: 3.10 s, 3.06 s, 3.62 s, 3.08 s. Which is the outlier, and what is the mean of the others?

5. A 50 N box sits on a base of 0.25 m². What pressure does it exert?

## Fix the mistake

6. Correct this statement: "A moving object needs a forward net force to keep going at a steady speed."

7. Correct this statement: "450 N to the left and 400 N to the right give a net force of 850 N."

8. Correct this statement: "600 N on 400 cm² gives a pressure of 600 ÷ 400 = 1.5 Pa."

9. Correct this statement: "One careful run is enough, and an odd result can just be deleted."

## Answer key (for parents and tutors)

1. A boat's engine pushes forward with 800 N. Water drag is 650 N backward. Find the net force and say what the boat does.
   **150 N forward, from 800 − 650, so the boat speeds up.**
2. A cyclist moves at a steady 20 km/h in a straight line. What is the net force on her, and how do you know?
   **Zero, because her speed and direction are not changing; her pedalling force exactly matches friction and air resistance.**
3. In a test of how the mass of a trolley affects its speed down a ramp, name the independent, dependent and two controlled variables.
   **Independent: the trolley's mass. Dependent: the time (or speed) down the ramp. Controlled: any two of ramp height, ramp length, surface, release method and the timer.**
4. Trial times: 3.10 s, 3.06 s, 3.62 s, 3.08 s. Which is the outlier, and what is the mean of the others?
   **3.62 s is the outlier. Mean = (3.10 + 3.06 + 3.08) ÷ 3 = 9.24 ÷ 3 = 3.08 s.**
5. A 50 N box sits on a base of 0.25 m². What pressure does it exert?
   **200 Pa, from 50 ÷ 0.25.**
6. Correct this statement: "A moving object needs a forward net force to keep going at a steady speed."
   **At a steady speed in a straight line the net force is zero; the forward push only cancels friction and air resistance.**
7. Correct this statement: "450 N to the left and 400 N to the right give a net force of 850 N."
   **Opposite forces subtract, so the net force is 450 − 400 = 50 N to the left, the way of the bigger force.**
8. Correct this statement: "600 N on 400 cm² gives a pressure of 600 ÷ 400 = 1.5 Pa."
   **Pascals need square metres, so convert 400 cm² to 0.04 m² first: 600 ÷ 0.04 = 15 000 Pa.**
9. Correct this statement: "One careful run is enough, and an odd result can just be deleted."
   **Repeat each test at least three times so an outlier stands out, and record any result you leave out along with the reason.**