Working out resultant forces in a straight line

1. A pupil pushes a box along the floor with a force of 25 N to the right. Friction acts with a force of 10 N to the left.
   Calculate the resultant force on the box and give its direction.
2. A dog pulls its lead forwards with a force of 40 N. The owner pulls backwards with a force of 18 N.
   Calculate the resultant force on the lead.
3. A shopping trolley is pushed forwards with a force of 75 N. Friction from the wheels acts backwards with a force of 20 N.
   Calculate the resultant force on the trolley and explain whether it will speed up or slow down.
4. A cyclist produces a forward driving force of 160 N. Air resistance acts backwards with a force of 95 N. Friction in the bike acts backwards with a force of 25 N.
   Calculate the resultant force on the cyclist.
5. A car is travelling along a straight, level road. The engine provides a forward force of 2400 N. Air resistance and friction together act backwards with a force of 2400 N.
   Calculate the resultant force and describe the motion of the car.
6. Two pupils push a broken-down go-kart forwards. One pushes with 180 N and the other pushes with 140 N. Friction acts backwards with a force of 210 N.
   Calculate the resultant force on the go-kart and state its direction.
7. A boat moves forwards through water. The engine provides a force of 850 N forwards. Water resistance acts backwards with a force of 420 N. Air resistance acts backwards with a force of 130 N.
   Calculate the resultant force and say whether the boat accelerates forwards.
8. A sledge is being moved across snow. One child pulls it forwards with a force of 120 N. Another child pushes it forwards with a force of 90 N. Friction acts backwards with a force of 70 N and air resistance acts backwards with a force of 15 N.
   Calculate the resultant force on the sledge.

9. A lorry is moving along a straight road. The engine provides a forward force of 6500 N. Air resistance acts backwards with a force of 1900 N. Friction acts backwards with a force of 2100 N. A headwind pushes backwards with a force of 800 N.
   Calculate the resultant force and explain what happens to the lorry's speed.
10. A heavy crate is being pulled in a warehouse. Two workers pull to the right with forces of 450 N and 320 N. One worker pulls to the left with a force of 250 N. Friction acts to the left with a force of 380 N.
    Calculate the resultant force on the crate and state the direction of the resultant force.