Age 14+ Level ★★
Worksheet 1

1. **Antifreeze**
   A large container holds 14 litres of a solution that is 25% antifreeze, the remainder being water. How many litres of antifreeze must be added to the container to make a solution that is 30% antifreeze?

2. **Platinum Puzzle**
   Platinum is a very rare metal, even rarer than gold. Its density is $21.5 \, \text{g/cm}^3$. Assuming that the world production has been about 110 tonnes for each of the past 50 years, and negligible before that, which of the following has a comparable volume to that of the total amount of platinum ever produced?

   A: a shoe box, B: a cupboard, C: a house, D: Buckingham Palace, E: the Grand Canyon

3. **Hillwalking**
   Andrew starts his walk along a flat path at an average speed of 4km/h. Then he climbs a hill at an average speed of 3km/h. On reaching the top, he comes straight back down at a speed of 6km/h and then goes back on the flat path at a speed of 4km/h again.

   The walk takes him 2 hours altogether.
   What is the total distance he walks?

4. **Travelator**
   At the airport, there is a moving walkway 500m long, which moves at a speed of 4km/h. Andrew and Bill step onto the walkway at the same time. Andrew walks with a steady speed of 6km/h on the walkway, whilst Bill stands still.

   When Andrew arrives at the end of the walkway, how far is he ahead of Bill?

5. **Travelling by Train**
   Stephen leaves Middlesbrough by train at 09:00. The train travels the first 27 km at 96 km per hour. It then stops at Darlington for 3 minutes, before travelling the remaining 29 km to Durham at the same speed.

   At what time does Stephen arrive in Durham?

These problems are adapted from UKMT (ukmt.org.uk) and SEAMC (seamc.asia) problems.