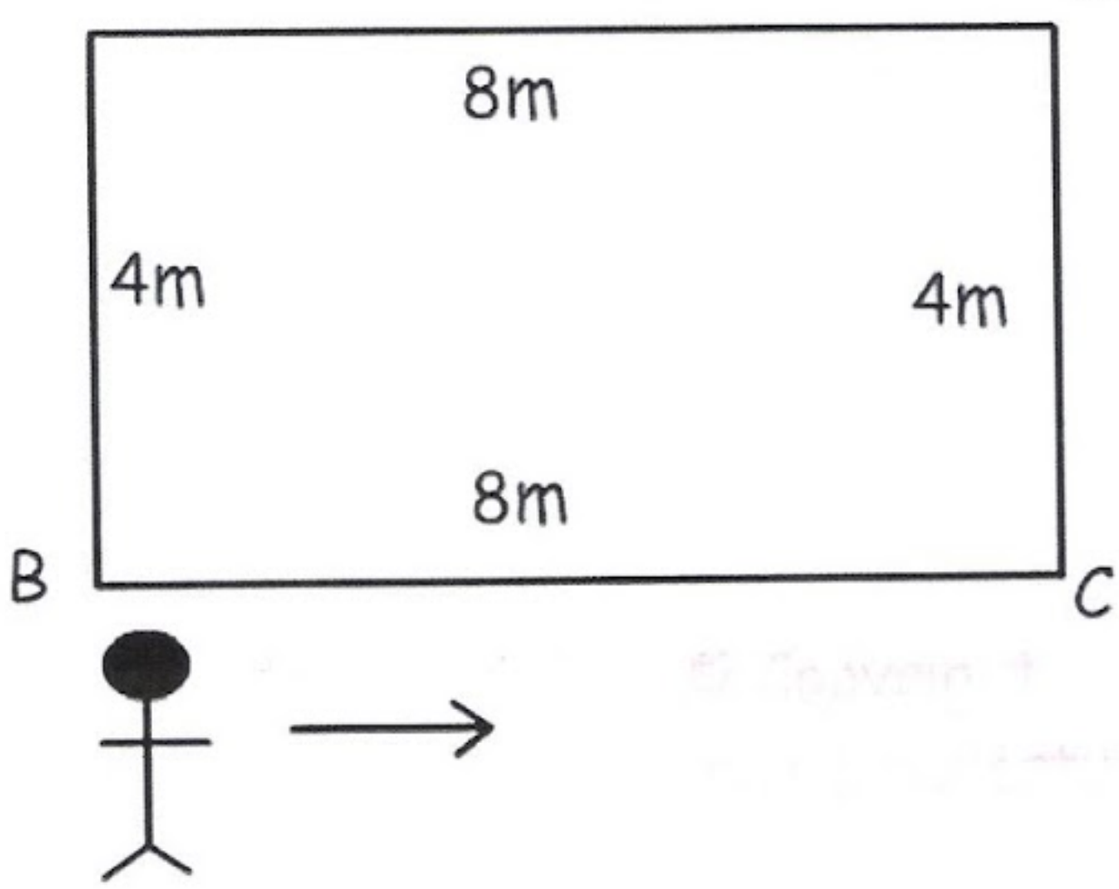
MOTION EXAM

NAME AND SURNAME_____

1) Look at the following picture:



The boy travels from D to A, A to B, B to C and C to D.

a) What is his displacement? 5 points

b) What is the total distance he has travelled? 5 points

SOLUTION:

a) **Displacement** is the distance, in a straight line, which separates two positions of a moving object at different moments in time.

In this case, as the initial and the final point are the same, the displacement is 0 m

b) The **distance travelled (s)** is the length a moving object goes measured on a trajectory.

$$s = 8 + 8 + 4 + 4 = 24\,m$$

2) An object moves a distance of 10 meters in 5 seconds. What is the average speed of the object? Express the result both in m/s and km /h. 4 points

SOLUTION:

$$v_m = \frac{s}{t}$$

$$v_m = \frac{10\ m}{5\ s} = 2\ m/s$$

$$v_m = 2\frac{m}{s} \cdot \frac{1\ km}{1000\ m} \cdot \frac{3600\ s}{1\ h} = 7{,}2\ km/h$$

3) A car drives with a constant speed of 54,72 kilometers per hour. How far can it travel in 3 hours? 3 points

SOLUTION:

$$s = v \cdot t$$

$$s = 54{,}72\frac{km}{\cancel{h}} \cdot 3\cancel{h} = 164{,}16\ km$$

4) Sarah roller skates with a constant speed of 22,53 kilometers per hour. How long will she take to travel a distance of 45,06 kilometers? 3 points

SOLUTION:

$$v_m = \frac{s}{t} \Rightarrow t = \frac{s}{v_m}$$

$$t = \frac{45{,}06\ \cancel{km}}{22{,}53\cancel{km}/h} = 2\ h$$

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5) A roller coaster car rapidly picks up speed as it rolls down a slope. As it starts down the slope, its speed is 4 m/s. But 3 seconds later, at the bottom of the slope, its speed is 22 m/s. What is its acceleration? 10 points

SOLUTION:

$$a = \frac{v_f - v_i}{t}$$

$$a = \frac{22 - 4}{3} = 6\ m/s^2$$