

Ch 2 Motion practice problems

Wednesday, January 28, 2009
3:17 PM

$$s = \frac{d}{t} \quad \left(\frac{d}{s \cdot t} \right)$$

Chapter 2: Motion

Distance/Displacement/Speed/Velocity Practice Problems

1. What is the speed of a truck that travels 10 km in 10 minutes?

$$s = \frac{10 \text{ km}}{10 \text{ min}} \quad s = 1 \text{ km/min}$$

2. What distance is traveled by a police car that moves at a constant speed of 1.5 km/minute for 5.0 minutes?

$$d = (1.5 \text{ km/min})(5 \text{ min}) \quad d = 7.5 \text{ km}$$

3. What distance would be covered in 10 minutes by a train that travels at a constant speed of 500 meters every 10 seconds?

$$t = (10 \text{ min})(60 \text{ sec/min}) = 600 \text{ sec} \quad s = 500 \text{ m/10 sec}$$

$$d = (50 \text{ m/s})(600 \text{ sec}) \quad d = 30000 \text{ m} \quad s = 50 \text{ m/sec}$$

4. What is the average speed of a commercial jet that travels from New York to Los Angeles (4800 km) in 6.00 hours?

$$s = \frac{4800 \text{ km}}{6 \text{ hr}} \quad s = 800 \text{ km/hr}$$

5. Convert your answer in problem #4 to m/s.

$$800 \text{ km} = 800000 \text{ m} \\ 1 \text{ hr} = 3600 \text{ sec}$$

$$s = \frac{800000 \text{ m}}{3600 \text{ sec}}$$

$$s = 222.22 \text{ m/s}$$

6. A car is traveling at an average speed of 70 m/s. How many km would the car travel in 6.5 hrs?

$$70 \text{ m} = 0.07 \text{ km}$$

$$t = (6.5 \text{ hr}) \left(\frac{3600 \text{ sec}}{1 \text{ hr}} \right)$$

$$d = (0.07 \text{ km/sec})(23400 \text{ sec}) \quad d = 1638 \text{ km} \quad t = 23400 \text{ sec}$$

7. A car moved 50 km to the North. What is its displacement?

$$50 \text{ km North}$$

8. A car moved 20 km East and 70 km West. What is the distance?

$$20 \text{ km} + 70 \text{ km} = 90 \text{ km}$$

9. A car moved 20 km East and 60 km West in 2 hours. What is its average velocity?

$$\text{displacement} = 40 \text{ km West} \quad v = \frac{40 \text{ km}}{2 \text{ h}} = 20 \text{ km/hr W}$$

10. How far will a car travel in 15 min at 20 m/s?

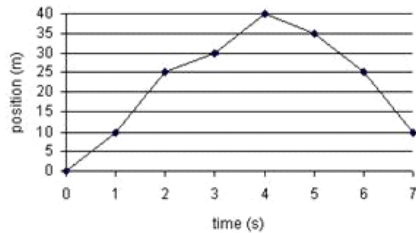
$$(15 \text{ min})(60) = 900 \text{ sec}$$

$$d = (20 \text{ m/s})(900 \text{ sec}) \quad d = 18000 \text{ m}$$

11. A car moved 60 km East and 90 km West. What is the distance?

$$60 \text{ km} + 90 \text{ km} = 150 \text{ km}$$

The below graph represents the position of a mouse at a given time.

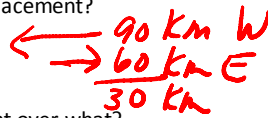


12. Describe the motion of the mouse. Please include calculations and units.

The 1st 4 sec, the mouse ran away from you at 10 m/s
 $s = 40\text{m}/4\text{sec} = 10\text{m/s}$; Then he ran back towards you
 the final 3 seconds at a rate of 10 m/s
 $s = 30\text{m}/3\text{sec} = 10\text{m/s}$

13. A car moved 60 km East and 90 km West. What is the displacement?

30 Km West



14. Average velocity can be calculated by dividing displacement over what?

time

15. What is the average velocity of a car that moved 60km in 3 hours?

$$= \frac{60\text{ km}}{3\text{ hr}} = 20\text{ km/hr} \text{ (don't know direction?)}$$

16. What is the average velocity of a car that moved 40 km East and 80 km West in 2 hours?

$$v = \frac{40\text{ km}}{2\text{ hr}} = 20\text{ km/hr W}$$

17. How far will a car travel in 25 min at 12 m/s?

$$25\text{ min} = 1500\text{ sec}$$

$$d = (12\text{ m/s})(1500\text{ sec}) \quad d = 18000\text{ m}$$

18. How far will a car travel in 2 hours at 20 m/s?

$$2\text{ hr} = 7200\text{ sec}$$

$$d = (20\text{ m/s})(7200\text{ sec}) \quad d = 144000\text{ m}$$

CHALLENGE PROBLEM

* 1. A rabbit and a turtle are practicing for their big race. The rabbit covers a 30. m practice course in 5.0 seconds, the turtle covers the same distance in 120 seconds. If the actual race is run on a 96 m course, by how many seconds will the rabbit beat the turtle?

$$\text{Rabbit speed} = \frac{30\text{ m}}{5\text{ sec}} = 6\text{ m/s} \quad \text{Find time - Rabbit } t = \frac{96\text{ m}}{6\text{ m/s}} = 16\text{ sec}$$

$$\text{turtle speed} = \frac{30\text{ m}}{120\text{ sec}} = 0.25\text{ m/s} \quad \text{turtle } t = \frac{96\text{ m}}{0.25\text{ m/s}} = 384\text{ sec}$$

$$\text{Difference} = 384 - 16 = 368\text{ sec or } 6.13\text{ min}$$

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