Name: _____

solutions

$t = 0.7666$ hours $= 2760$ sec

more common in general usage

1. A car takes 46 mins to drive 72 km to Kamloops. How fast is the car going?

→ in Km/hr
or m/s ?
→ more useful to us

$$V = \frac{d}{t} = \frac{72 Km}{.7666 hr} = 93.9 \ Km/hr$$

$$\text{or} = \frac{72,000 m}{2760 sec} = 26.1 \ m/s$$

2. A runner travels at 7.7 m/s for 1 min. How far does the runner travel?

$$d = V \cdot t = (7.7)(60 sec) = 462 \ m$$

3. A plane travels to Vancouver (390 km to the airport) at a speed of 350 km/hr. How long does the trip take?

$$t = \frac{d}{V} = \frac{390 \ Km}{350 \ Km/hr} = 1.11 \ hours$$

4. Convert 95 km/hr to m/s (Show your working)

$$95 \ Km/hr \times \frac{1 \ hr}{3600 sec} \times \frac{1000 m}{1 \ Km} = 26.4 \ m/s$$

5. How many seconds are in 1.2 hours? (Show your working)

$$1.2 \ hours \times \frac{3600 \ sec}{1 \ hour} = 4320 \ sec.$$
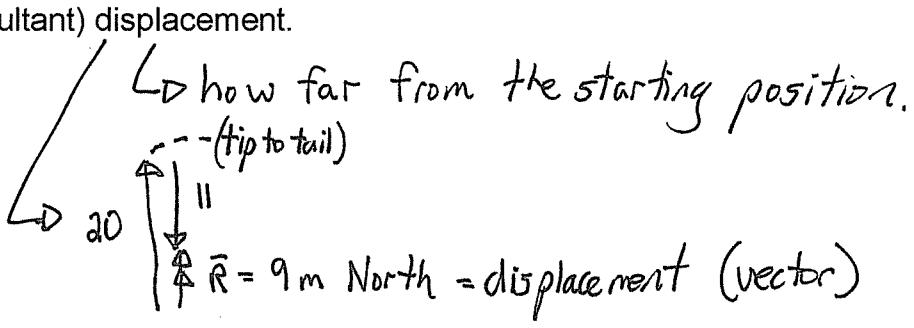
6. Convert 23 m/s into km/hr (Show your working)

$$23 \ m/s \times \frac{3600 sec}{1 \ hour} \times \frac{1 \ Km}{1000 m} = 82.8 \ Km/hr$$

7. How many meters in 1.5 km? (Show your working)

$$1.5 \ Km \times \frac{1000 m}{1 \ Km} = 1500 m$$

8. A woman walks 20 m North and then 11 m South. Find the total distance travelled and the (resultant) displacement.

$\angle_D$ how far from the starting position.

--(tip to tail)

20 | | 11

$\bar{R}$ = 9 m North = displacement (vector)

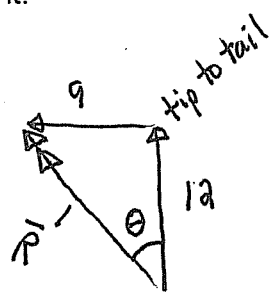$\angle_D$ = 20 + 11 = 31 m.

Scalar

9. Mr. Coates walks 5 steps forward (+) and 3 steps backwards (-), find the total distance travelled and the displacement.

5 | | 3
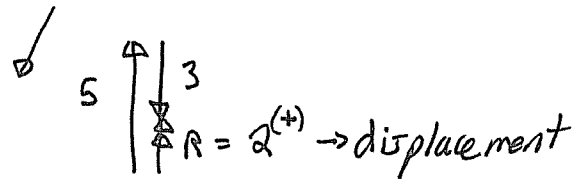
R = 2$^{(+)}$ → displacement

$\angle_D$ 5 + 3 = 8 steps

distance

10. Mr. Coates walks 12 steps North and then 9 steps West. Find the total distance travelled and the displacement.

$\angle$ 12 + 9 = 21 steps
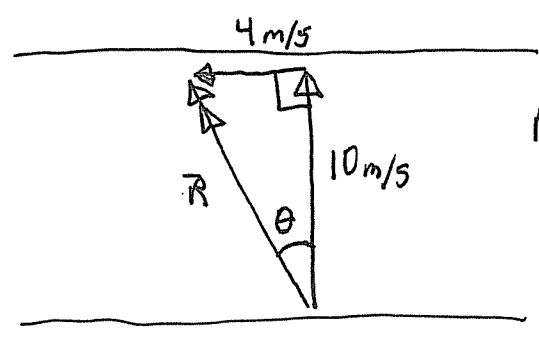
9   tip to tail

$\bar{R}$ θ 12

use pythagoras

$R^2 = 12^2 + 9^2$

$R = \sqrt{225} = 15$

$\tan\theta = \frac{9}{12}$

$\theta = 37°$ W of N

11. A boat crosses a river with a speed of 10 m/s directly across the river. The speed of the current is 4 m/s. Find the resultant velocity of the boat.

4 m/s

R 10 m/s

θ

$R^2 = 4^2 + 10^2$

$R = 10.8$ m/s

$\tan\theta = \frac{4}{10}$

$\boxed{\tan^{-1}}$

↪ $\theta = 21.8°$

12. A boat crosses a 90 m wide river with a speed of 17 m/s across the river. The speed of the river is 3 m/s.

a) How long does it take the boat to cross the river?

make sure velocity and distance match (have the same direction)

$$t = \frac{d}{v} = \frac{90}{17} = 5.29 \text{ sec}$$

b) How far down the river does the boat drift?

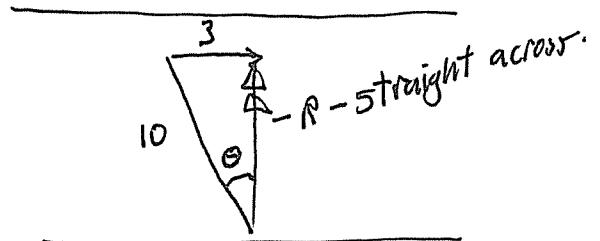$$d = v \cdot t = (3)(5.29) = 15.9 \text{ m}$$

13. A boat travelling at 10 m/s wants to cross a 60 m river with a current of 3 m/s and not drift down stream at all.

At what angle must the boat point up stream?

$$\tan\theta \quad \sin\theta = \frac{opp}{hyp} = \frac{3}{10}$$

$$\boxed{\sin^{-1}}$$

$$\theta \sim 17.5°$$

How long does it take the boat to cross the river?

↳ need to find velocity (resultant) across river.

$$3^2 + R^2 = 10^2 \rightarrow 10^2 - 3^2 = R^2 \rightarrow 91 = R^2 \rightarrow R = 9.5394 \text{ m/s}$$

$$t = \frac{d}{v} = \frac{60}{9.5394} = 6.29 \text{ sec}.$$

14. A car is travelling at 25 m/s and slows to 20 m/s. Find the change in velocity.

$$\Delta V = V_f - V_i = 20 - 25 = -5 \text{ m/s}$$

15. A car is travelling at 25 m/s and accelerates to 30 m/s. Find the change in velocity.

$$\Delta V = V_f - V_i = 30 - 25 = 5 \text{ m/s}$$

16. A car is travelling North at 25 m/s and after colliding with a truck is travelling 10 m/s south. Find the change in velocity.

call North ⊕ and south ⊖

$$\Delta V = V_f - V_i = -10 - 25 = -35 \text{ m/s}$$

17. A ball is thrown at 12 m/s and sticks to the wall upon impact. Find the change in velocity.

$$\Delta V = V_f - V_i = 0 - 12 = -12 \text{ m/s}$$

18. A ball is thrown at 13 m/s and bounces off the wall at 8 m/s. Find the change in velocity.

⊕   ⊖

$$\Delta V = V_f - V_i = -8 - 13 = -21 \text{ m/s}$$