Formula Challenge Name Key Period _____

WEEK 1: Score _____ / 12 (For Teacher)

**What do the following units represent? Use D for distance, T for time, S for speed, or A for acceleration.**

| | | | |
|---|---|---|---|
| D 1. 14 km | T 4. 6 hours | D 7. 14 mi | D 10. 1.4 m |
| S 2. 30 m/s | A 5. 12 cm/s2 | T 8. 3.2 sec | A 11. 6 cm/min/sec |
| T 3. 34 min | S 6. 150 mph | D 9. 25 ft | A 12. 3 km/hr/sec |

WEEK 2: Score _____ / 5 (For Teacher)

**Solve each problem! Be sure to show your work!**

1. Goldie Goldfish, a speed swimmer, loves to race around the park's pond, which is 0.5 miles around. If she can swim 20 laps around the track in 2 hours, what is her average speed?

Avg S = Total Distance / Total Time = $\frac{0.5 \times 20}{2\text{ h}} = \frac{10\text{ mi}}{2\text{ h}} = 5\text{ mi/h}$

2. It takes Stu, a slimy slug, 20 minutes to travel from his favorite bush to the local trash can (a trip of 30 meters), how far can he travel in 1 hour (60 minutes)?

$\frac{30\text{ m}}{20\text{ min}} = \frac{x}{60\text{ min}}$ → $1800 = 20x$ → $90 = x$

20 min. = 30 meters ... if Stu maintains this speed, he can travel 90 meters in one hour. (20 min. + 20 min. + 20 min. = 60 min.)

His speed is: $\frac{90\text{ m}}{60\text{ min}} = 1.5\ \frac{\text{m}}{\text{min}}$

3. At exactly 2:00 pm, Speedy the Snail crawls onto a meter stick at the 10 cm mark. If he reaches the 65 cm mark at exactly 2:10 pm, what is his speed?

Distance travelled = 65 cm − 10 cm = 55 cm

Time for travel = 2:10 pm − 2:00 pm = 10 min.

$S = \frac{D}{T} = \frac{55\text{ cm}}{10\text{ min.}} = 5.5\text{ cm/min.}$

$\frac{3}{5} = \frac{15}{x} \rightarrow \frac{3x}{3} = \frac{75}{3} \rightarrow x = 25$

(cross multiply)

4. If it takes Leaping Louie 5 minutes to jump 3 blocks, how long will it take for him to jump 15 blocks?

3 goes into 15 FIVE times. If Louie can jump 3 blocks in five minutes, it will take him 25 minutes to jump 15 blocks. His average speed would be... $\frac{15 \text{ blocks}}{25 \text{ min}} =$ 0.6 blocks/min.

5. If Bert the Bat travels eastward at 40 mph with a tail wind of 6 mph, what is his actual speed?

40 mph + 6 mph (wind push) = 46 mph

WEEK 3: Score _____ / 5 (For Teacher)

**Solve each problem! Be sure to show your work!**

1. Toon Train is traveling at the speed of 10 m/s at the top of a hill. Five seconds later it reaches the bottom of the hill and is moving at 30 m/s. What is the rate of acceleration of Toon Train?

$A = \frac{\Delta V}{T} = \frac{30 \text{ m/s} - 10 \text{ m/s}}{5 \text{ s}} = \frac{20 \text{ m/s}}{5 \text{ s}} = 4 \text{ m/s}^2$

*"$\Delta$" means "change". $\Delta V$ = change in velocity

2. Pete the Penguin loves to sled down his favorite hill. If he hits a speed of 50 m/s after 5 seconds, what is his rate of acceleration? Hint: He starts at 0 m/s at the top of the hill.

$A = \frac{\text{Final Velocity} - \text{Original Velocity}}{\text{Time}} = \frac{50 \text{ m/s} - 0 \text{ m/s}}{5 \text{ s}} = \frac{50 \text{ m/s}}{5 \text{ s}} = 10 \text{ m/s}^2$

3. Monster Mike's truck decelerates from 72 m/s to 0 m/s in 6 seconds. What is his rate of deceleration?

$A = \frac{\Delta V}{T} = \frac{0 \text{ m/s} - 72 \text{ m/s}}{6 \text{ sec}} = \frac{-72 \text{ m/s}}{6 \text{ s}} = -12 \text{ m/s}^2$

4. What is a race car's average acceleration if its speed changes from 0 m/s to 40 m/s in 4 seconds?

$$A = \frac{\Delta V}{T} = \frac{40\ m/s - 0\ m/s}{4s} = \frac{40\ m/s}{4s} = \boxed{10\ m/s^2}$$

5. A falling raindrop accelerates from 10 m/s to 30 m/s in 2 seconds. What is the raindrop's average acceleration?

$$A = \frac{\Delta V}{T} = \frac{30\ m/s - 10\ m/s}{2s} = \frac{20\ m/s}{2s} = \boxed{10\ m/s^2}$$