

ANSWERS Science 10: Exam Review: Physics

- Define the following terms: You can find the definitions in the glossary of your textbook as well as your notes
- State the number of significant digits in each of the following values:

| | | |
|--------|--------|--------|
| a. 3SF | c. 2SF | e. 4SF |
| b. 1SF | d. 4SF | f. 1SF |
- Round each of the following to four significant digits

| | | |
|-------------|--------------|-------------|
| a. 0.004563 | d. 0.0002368 | g. 48.89 |
| b. 25.37 | e. 306.5 | h. 0.005065 |
| c. 1001 | f. 3001 | |
- Evaluate each of the following using either the certainty or the precision rules for significant figures.

| | | |
|--------------|------------|----------|
| a. 121 | b. 24.7 cm | c. 1 min |
| d. 89.3 km/h | e. 13.1h | f. 2h |

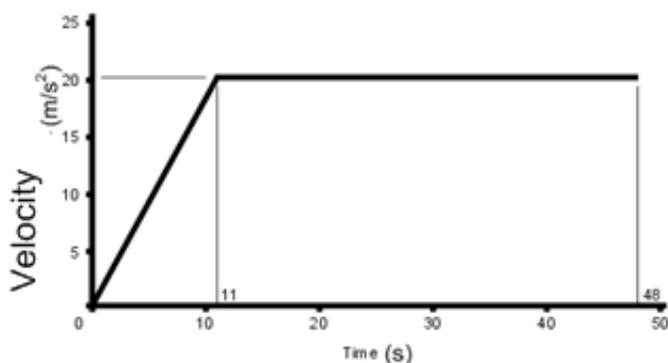
5. Use the following graph to answer the questions below:

a) What is the average speed between:

- i) a and b $v = \frac{d_2 - d_1}{t_2 - t_1} = \frac{8 - 0}{1.5 - 0} = \frac{8}{1.5} = 5.3 \text{ m/s}$
- ii) b and c $v = \frac{d_2 - d_1}{t_2 - t_1} = \frac{6.5 - 8}{3 - 1.5} = \frac{-1.5}{1.5} = -1 \text{ m/s}$
- iii) c and d $v = \frac{d_2 - d_1}{t_2 - t_1} = \frac{6.5 - 6.5}{6 - 3} = \frac{0}{3} = 0 \text{ m/s}$
- iv) d and e $v = \frac{d_2 - d_1}{t_2 - t_1} = \frac{1.5 - 6.5}{8 - 6} = \frac{-5}{2} = -2.5 \text{ m/s}$

b) Which line shows the greatest speed? From a to b

6. Use the following graph to answer the questions below:



a. What is the acceleration between:

i) between 0 seconds and 11 seconds

$$v = 20 \text{ m/s} \quad t = 11 \text{ s}$$

$$a = \frac{v}{t} = \frac{20 \text{ m/s}}{11 \text{ s}} = 1.8 \text{ m/s}^2$$

ii) 11 seconds and 48 seconds

$$t = 48 \text{ s} - 11 \text{ s} \quad v_1 = 20 \text{ m/s}$$

$$t = 37 \text{ s} \quad v_2 = 20 \text{ m/s}$$

$$a = \frac{v_2 - v_1}{t} = \frac{20 \text{ m/s} - 20 \text{ m/s}}{37 \text{ s}} = 0 \text{ m/s}^2$$

b. Determine the total distance travelled from 0 seconds to 48 seconds.

$d = \frac{1}{2} v \times t$ in the triangular section 0 s to 11 s

$$d = \frac{1}{2} (20 \text{ m/s}) \times (11 \text{ s})$$

$$d_1 = 110 \text{ m}$$

Total = $d_1 + d_2$

$$= 110 \text{ m} + 740 \text{ m}$$

$$= 850 \text{ m}$$

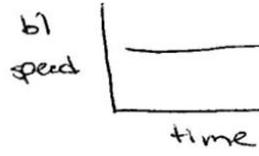
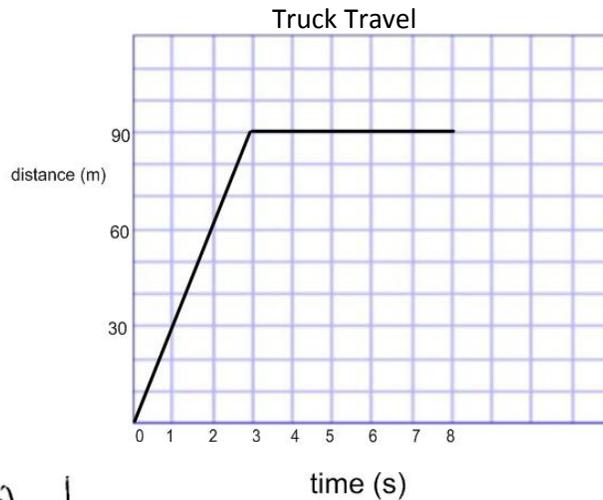
$d = v \times t$ in the square section 11 s to 48 s

$$d = (20 \text{ m/s}) \times (37 \text{ s})$$

$$d_2 = 740 \text{ m}$$

7. A truck travels a constant speed of 30m/s for 3 seconds and then stops for 5 seconds at a stop sign.

| Distance (m) | Time (s) |
|--------------|----------|
| 0 | 0 |
| 30 | 1 |
| 60 | 2 |
| 90 | 3 |
| 90 | 4 |
| 90 | 5 |
| 90 | 6 |
| 90 | 7 |
| 90 | 8 |



Using the following formulas solve each of the following:

9. If it takes 0.99s for an air bag to stop a person, what is the acceleration of a person moving at 15m/s and coming to a complete stop in that time?

$$t = 0.99s$$

$$v_1 = 15 \text{ m/s}$$

$$v_2 = 0 \text{ m/s}$$

$$a = ?$$

$$a = \frac{v_2 - v_1}{t} = \frac{0 \text{ m/s} - 15 \text{ m/s}}{0.99} = -14.85 \text{ m/s}^2 \approx -15 \text{ m/s}^2$$

10. If two hikers walk the trans-Canada trail for 6.0h and covered 31km, what is their average speed for the day?

$$T = 6.0h$$

$$D = 31 \text{ km}$$

$$v = \frac{d}{t} = \frac{31 \text{ km}}{6.0h} = 5.2 \text{ km/h}$$

11. Mary walked for 2.1h at a speed of 3.6km/h. What distance did Mary travel?

$$T = 2.1h$$

$$V = 3.6 \text{ km/h}$$

$$d = vt = (3.6 \text{ km/h})(2.1h) = 7.6 \text{ km}$$

12. In the final leg of a round the world trip a balloon flew for 18h at an average of 210km/h. How far did it travel?

$$T = 18h$$

$$V = 210 \text{ km/h}$$

$$d = vt = (210 \text{ km/h})(18h) = 3800 \text{ km}$$

13. A car travels a distance of 143m at an average speed of 95 km/h. How long did the trip take?

$$d = 143 \text{ m}$$

$$v = 95 \text{ km/h}$$

convert 95km/h to m/s $\div 3.6 = 26 \text{ m/s}$

$$t = \frac{d}{v} = \frac{143 \text{ m}}{26 \text{ m/s}} = 5.5 \text{ s}$$

14. Joe is accelerating from rest at a rate of 1.5m/s² for 10.0 sec. What is the final speed reached by Joe?

$$a = 1.5 \text{ m/s}^2$$

$$t = 10.0s$$

$$v_1 = 0 \text{ m/s}$$

$$v_2 = v_1 + a \times t$$

$$= 0 + (1.5 \text{ m/s}^2) \times (10.0s)$$

$$v_2 = 15 \text{ m/s}$$

15. A train is accelerating at a rate of 2m/s². If its initial speed is 20m/s and it travels for 30 seconds what is its final velocity?

$$a = 2 \text{ m/s}^2$$

$$v_1 = 20 \text{ m/s}$$

$$t = 30s$$

$$v_2 = v_1 + at$$

$$v_2 = 20 \text{ m/s} + (2 \text{ m/s}^2)(30s)$$

$$v_2 = 20 \text{ m/s} + 60 \text{ m/s}$$

$$v_2 = 80 \text{ m/s}$$

16. While pulling a barge, a tugboat accelerates at 0.11 m/s² to produce a 5.0 m/s change in speed of the barge. How long did this take?

$$a = 0.11 \text{ m/s}^2$$

$$v = 5.0 \text{ m/s}$$

$$t = \frac{v}{a} = \frac{5.0 \text{ m/s}}{0.11 \text{ m/s}^2} = 45 \text{ s}$$

17. The NASA Space Shuttle touches down on a runway and begins accelerating at a speed of -8.80 m/s². It comes to a stop after 40 s on the runway. What was its speed when it hit the runway?

$$a = -8.80 \text{ m/s}^2$$

$$v_2 = 0 \text{ m/s}$$

$$t = 40s$$

$$v_1 = v_2 - at$$

$$v_1 = 0 \text{ m/s} - (-8.80 \text{ m/s}^2)(40s)$$

$$v_1 = 0 \text{ m/s} - (-352 \text{ m/s})$$

$$v_1 = 352 \text{ m/s}$$

18. A runner achieves a velocity of 12.20 m/s; 10.0 sec after he begins calculate his acceleration.

$$v = 12.20 \text{ m/s} \quad a = \frac{v}{t} = \frac{12.20 \text{ m/s}}{10.0 \text{ s}} = 1.22 \text{ m/s}^2$$
$$t = 10.0 \text{ s}$$

19. It takes Johnny 0.30 hour to drive to school. His route is 20.0 km long. What is Johnny's average speed on his drive to school?

$$t = 0.30 \text{ h} \quad v = \frac{d}{t} = \frac{20.0 \text{ km}}{0.30 \text{ h}} = 67 \text{ km/h}$$
$$d = 20.0 \text{ km}$$
$$v = ?$$

20. A bottle nosed dolphin is cruising along and then accelerates at 0.50 m/s^2 to reach a final speed of 9.7 m/s after 15s. What was the initial speed of the dolphin?

$$a = 0.50 \text{ m/s}^2 \quad v_i = v_f - at$$
$$v_f = 9.7 \text{ m/s} \quad v_i = 9.7 \text{ m/s} - (0.50 \text{ m/s}^2)(15 \text{ s})$$
$$t = 15 \text{ s} \quad v_i = 9.7 \text{ m/s} - 7.4 \text{ m/s}$$
$$v_i = 2.3 \text{ m/s}$$

21. In 1997, *Thrust SSC*, the world's fastest jet-engine car, traveled 715m at an average speed of 325m/s. The length of time it took in minutes was?

$$d = 715 \text{ m} \quad t = \frac{d}{v} = \frac{715 \text{ m}}{325 \text{ m/s}} = 2.2 \text{ s} \quad \text{convert seconds to minutes } 2.2 \text{ s} \times \frac{1 \text{ minute}}{60 \text{ seconds}} = 0.037 \text{ minutes}$$
$$v = 325 \text{ m/s}$$
$$t = ?$$

22. Starting from rest if your acceleration is 4.5 m/s^2 how fast are you travelling after 4 seconds?

$$V_i = 0 \quad v_f = v_i + at$$
$$a = 4.5 \text{ m/s}^2 \quad v_f = 0 + (4.5 \text{ m/s}^2)(4 \text{ s})$$
$$t = 4 \text{ s} \quad v_f = 0 + 18 \text{ m/s}$$
$$v_f = ? \quad v_f = 18 \text{ m/s}$$

23. A car increases its acceleration from 0 to 80km/h in 30 seconds its acceleration is?

$$V_i = 0 \text{ km/h} \quad a = \frac{v_f - v_i}{t} = \frac{80 \text{ km/h} - 0 \text{ km/h}}{30 \text{ s}} = \frac{80 \text{ km/h}}{30 \text{ s}} = 2.67 \text{ km/h/s}$$
$$V_f = 80 \text{ km/h}$$
$$t = 30 \text{ s}$$