Science 10

Physics

Name:_____

Semester 1 2010

Significant Digits

Remember:

- Digits 1- 9 are always significant
- Leading zeros are not significant
- Trailing zeros are significant
- Zeros positioned between the digits 1-9 are significant

Rules for Significant Digits:

When adding or subtracting

_____

_____

When multiplying or dividing:_____

_____

1. Multiply or divide. Be sure to record your answer with the correct number of significant digits.
   a) 46.0/20.00 =
   b) 40 x 52.00 =
   c) 0.00860/28.50 =
   d) 0.500/8 =
   e) 0.049 x 58.00 =
   f) 0.400 x 0.50 =
   g) 8000 / 2.02 =
   h) 400 / 60.00 =
   i) 0.0950 x 22.99 =
   j) 0.500 x 0.65 x 98.00 =

2. Add or subtract. Be sure to record your answer with the correct number of significant figures.
   a) 46.030 – 2.9=
   b) 56 + 1.202 =
   c) 13.2100 - 0.00123 =
   d) 14.96 + 0.25 =
   e) 71.0019 – 1.863 =

3. Rewrite the following numbers using scientific notation to **three** significant figures.
   a) 5684002_____
   b) 5800_____
   c) 86000000000_____
   d) 0.00420_____
   e) 93000000_____
   f) 450000_____
   g) 0.00581_____
   h) 0.00360_____
   i) 300000000_____
   j) 0.000000000455_____
   k) 0.003470078_____

4. How are m/s converted to Km/h and Km/h converted into m/s?
5. Convert the following:

   a) 24Km = _____m
   b) 3.5h = _____min
   c) 126min = _____h
   d) 4138m = _____Km
   e) 2.25h = _____s
   f) 8940s = _____h
   g) 34m/s = _____km/h
   h) 124km/h = _____m/s
   i) 16m/s = _____km/h
   j) 11.5Km/h = _____m/s

Remember 1km = 1000m and 60 s = 1 min and 60 min = 1 hour

Average Speed Calculations

Formula v = d/t

1. Tony the Tiger walks 100m in 50.0s. What is his average speed?

2. Barry rides his bike from Lethbridge to Calgary a distance of 250Km without stopping (crazy man). The trip takes him 10.0 hours. What was his average speed?

3. Nemo, the fish, swims in a straight line for 50.0 minutes while he searches for his friend Dory a distance of 700m. What was Nemo's average speed in m/s?

4. Jughead walks at a constant speed of 2.00m/s for a period of 3.00 minutes in search of hamburgers. If he walks in a straight line how far did he travel?

5. A roadrunner runs away from Wiley Coyote at a uniform speed of 1.25m/s for 245s. What distance did the roadrunner cover?

6. Prince Charming rides his horse at a constant speed of 0.50m/s. If he rides for 25 minutes how far did he go?

7. Lightning McQueen drives from Grand Prairie to Thorhild on his way to the Edmonton Indy a distance of 320Km. If he drives at a constant speed of 80km/h how long will it take?

8. Belle runs away from the beast at a distance of 2.00km at a constant speed of 1.10m/s. How long did it take her to outrun the beast?

9. Harry Potter flies a distance of 1300km at a constant speed of 652km/h. How much time will this take? Will he have a sore butt?

10. Dopey runs a marathon of 26.2 km in 8.23 hours. What was his average speed in km/h?

Introduction to Scalars and Vectors

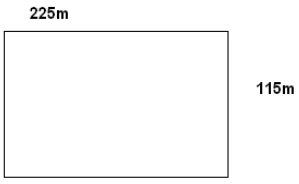
Define vector and give an example:

Define scalar and give an example:

Scalars and Vectors Practice Worksheet

1. If a camel walks through the desert 275m east and then turns around and walks 425m west.
   a) What is the distance the camel travels?
   b) What is the displacement of the camel?

2. A chimpanzee goes for a walk around the block as described below.



   a. What is the distance covered by the chimpanzee?

   b. What is the displacement of the chimpanzee?

3. A boy is jumping on a trampoline he jumps 2.0m in the air and then returns to the trampoline where his second jump takes him 3.0m into the air before returning to the trampoline. His third jump only takes him 1m into the air and then he returns back to the trampoline.
   a) What is the boy's displacement?
   b) What is the boy's distance?

Scalar and Vector Worksheet

Answer the following showing all work including formulas, substitution, units and proper significant figures!

1. A lost dog walks 10.0blocks (W), 7.0 blocks (E), 15 more blocks (W) and then 2.5 blocks (E).
   a) What distance did the dog walk? (1 mark)

   b) What is the displacement of the dog from the starting point, draw a diagram? (2 marks)

2. Jane is going on a trip to Calgary. She drives 150Km (S) to Red Deer in 1.5hours, stops in Red Deer for coffee (0.25 hours) then she drives the remaining 150km to Calgary in 2.0hours.
   a) What displacement did she drive? (1 mark)

   b) What was her average velocity? (2 marks)

   c) After staying in Calgary for 4 hours, she drives the 300Km (N) to Edmonton in 2.8hours. Calculate her average speed and velocity for the entire trip. (3 marks)

3. Doug lives 300m south of school. After school, he walks to the store which is 200m north of the school. After going to the store, he walks to a friend's house that is 75m south of the school.
   a) At the end of his trip, what is his displacement relative to the school (Draw a diagram)? (2 marks)
   b) At the end of the trip, what is his displacement relative to his home (Draw a diagram)? (2 marks)

Constant Acceleration

Formula:

1. A car is stopped at a red light when it turns green the car accelerates away. After 6.00 s the car is travelling at a rate of 4.25m/s. Determine the acceleration of the car.

2. A golf ball is sitting on a tee. 0.53s after the ball is hit it is travelling with a speed of 65.0km/h. What is the acceleration of the ball during that period? (hint convert 65.0km/h into m/s)

3. A car is moving at a speed of 50.0km/h (_____m/s) and it accelerates to 60.0 km/h (_____m/s) in a period of 4.5s in order to pass another vehicle. What is the acceleration of the car?

4. A bike starts from rest and obtains speeds of 2.00m/s while accelerating at a rate of $0.50 m/s^2$.How long did it take for the bike to gain speed of 2.00m/s?

5. A track athlete is running and slows down by changing her speed by 1.50m/s (-1.5m/s) while decelerating at a rate of $0.62 m/s^2$ ($-0.62 m/s^2$). How long did this take?

6. The itsy bitsy spider is moving when it senses danger it changes its speed by 0.450m/s. It was accelerating at a rate of $0.952 m/s^2$. How many seconds did it take the spider to do this?

7. Little miss muffett accelerates at a rate of $2.05 m/s^2$ for a period of 12.0s while she runs away from the itsy bitsy spider. By how much did her speed change?

8. A plane is coming in to land. If it is moving at a rate of 150km/h when the tires touch the pavement. If it can decelerate at a rate of $2.00 m/s^2$ by applying the brakes how long does it take to stop the plane? (hint convert everything to m/s)

Physics Worksheet # 1

1. Liam rides his bike a distance of 250km without stopping. The trip takes him 10.0h. What was his average speed? (2 marks)

2. Ricky walks east at a constant velocity of 2.00m/s for a period of 3.00 min. What was her displacement? (2 marks)

3. A golf ball is sitting on a tee. 0.25s after the ball was hit; it is travelling with a velocity of 71km/h north. What is the acceleration of the ball during this period? (2 marks)

4. Natasha ran at a constant velocity of 2.0 m/s (W) for 65s and then turned around and walked 1.00m/s (E) for 85 s.

   a) What is her total distance? (2 marks)

   b) What was her average velocity? (2 marks)

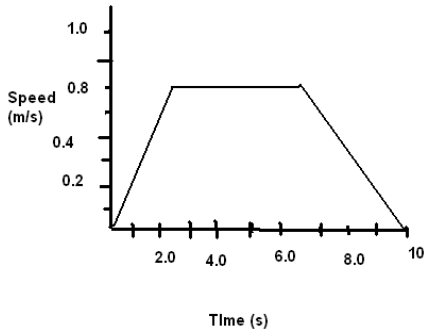
5. Curious George accelerates at a rate of 2.05m/s^2 for a period of 12.0 s. By how much did his speed change? (2 marks)

6. A turtle wants to accelerate from 2mm/s to 9mm/s. How long will it take if its maximum acceleration is 3 mm/s^2? (2 marks)

7. What does the following represent? (3 marks)

a. The area under a distance- time graph_____
b. The slope of a distance – time graph _____
c. The slope of a velocity- time graph _____

8. Use the following graph to answer these questions



a) Describe the motion of the cart. (1 mark)

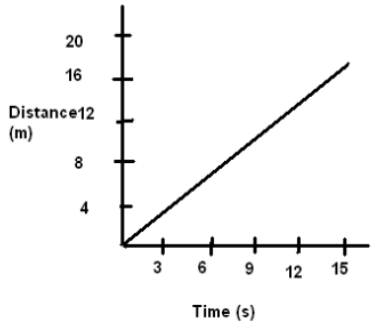
b) What was the acceleration of the cart when it was speeding up? (1 mark)

c) For what distance was the cart travelling at the same velocity? (1 mark)

d) What was the acceleration of the cart while it was slowing down? (1 mark)

e) What was the distance covered between 6 and 8 seconds? Use the formula please. (1 mark)

9. Find the slope of the graph (2 marks)



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10. A car is moving at a speed of 50.0 km/h and it decelerates to 30km/h in a school zone. If this takes 4.5 s what is the rate of deceleration? (hint convert everything to m/s) (2 marks)

Work

Formula:

1. How much work is done by a 230N force acting over a distance of 20.0m?

2. A 2300Kg car accelerates at 20.0m/s^2. If the car does this for 400m, how much work does the engine do?

3. A horse does 3300J of work while pulling a sled 0.500km. What force does the horse exert?

4. What is the mass of an object that does 1600J of work while acceleration at 2.30m/s^2 over a distance of 135 m?

5. A 50.0kg object is lifted 10.0m. What is the work done? How much energy is used?

6. What are the three conditions for work to be done?

Are you Ready For Your Test?

1. Define
    a. Vector
    b. Force
    c. Scalar
    d. Displacement
    e. velocity

2. A car goes from 26 km/h to 37 km/h in 3.6 minutes. What is it's acceleration?

3. A car travels at 25m/s east for 15 minutes, stops for 10 minutes and then travels 30m/s west for 10 minutes. What is the vehicle's
    a. distance
    b. displacement

4. A 3.00kg bowling ball is accelerating at a rate of 1.40m/s^2. What is the force exerted on the ball?

5. A 1200kg truck is stopped at a light. If the truck accelerates to 80km/h in 8.00s, what is the force needed? (two steps)

6. A car is headed towards the hulk. Hulk pushes the 1500kg car with a 30 000N force and brings it to a stop. What was the acceleration of the car?

7. A 25 N force is used to push a ball with an acceleration of 1.25m/s^2. What is the mass of the ball?

8. A bird is flying with an acceleration of 0.50m/s^2 for 0.25 minutes. What is the change in velocity of the bird?

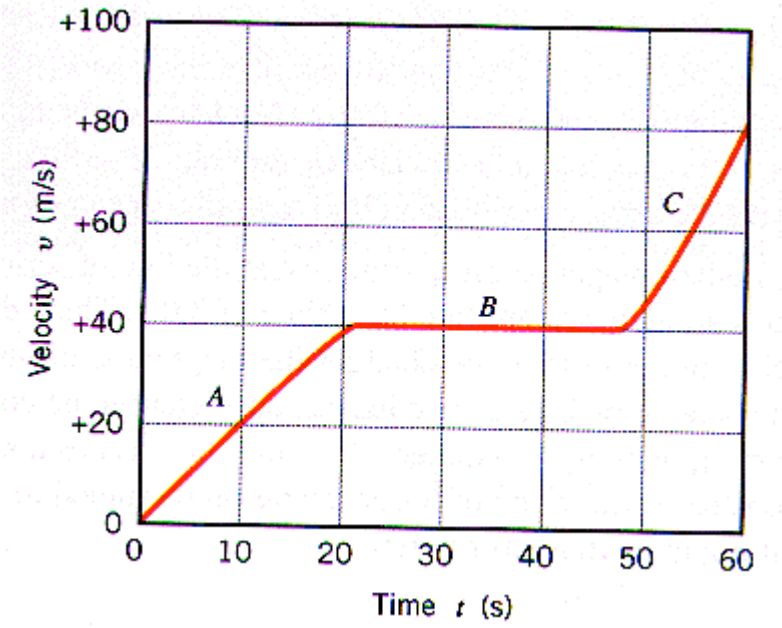
9. Draw a v/t graph that represents a skateboard that accelerates at 2.5m/s^2 for 3 seconds, stays at that speed for 2 seconds and then decelerates at 3m/s^2 until stopped. (you will need some data tables)

10. What is the average speed of a moped that travels at 60km/h for 3.5 hours and then at 110km/h for 1.5 hours?

11. What is the average velocity of a horse and buggy that travels at 60km/h east for 3.5 hours and then at 110km/h west for 1.5 hours?

12. Mr. Cool manages to get his smart car up to 110 km/h one day, but can only keep it going that fast for 3650 s. How far would he travel during that time (assuming that he drives at a constant speed)?

13.



a. find the acceleration of the vehicle at a.
b. find the distance the vehicle travels between 20 and 40 seconds

14. An 0.16kg apple and a 650kg steel ball is dropped in a vacuum tube. They both hit the ground at the same time…but not the same force. Find the force with which the apple and the ball hit the ground.