So lutions

1. The number of significant figures in 15.0 is

(A) 1

(B) 2

(C) 3 ●

(D) 4

(E) 5

2. The average speed of a moving object during a given interval of time is always:

(A) the magnitude of its average velocity over the interval

(B) the distance covered during the time interval divided by the time interval ●

(C) one-half its speed at the end of the interval

(D) its acceleration multiplied by the time interval

(E) one-half its acceleration multiplied by the time interval.

3. Special Question: Two automobiles are 150 kilometers apart and traveling toward each other. One automobile is moving at 60km/h and the other is moving at 40km/h mph. In how many hours will they meet?

(A) 2.5

(B) 2.0

(C) 1.75

(D) 1.5 ●

(E) 1.25

60 km/h   -40 km/h

$\Delta x = vt$

$t = \frac{\Delta x}{v} = \frac{150}{100} = 1.5$

$\Delta x = 150$
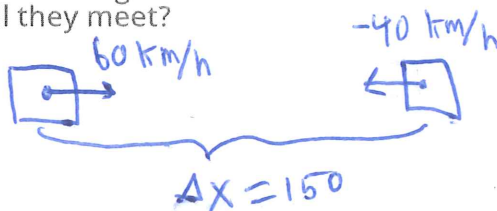
Since they are travelling toward each other it is "as if" the velocity relative to each other is 100 km/h

4. A car starts from Hither, goes 50 km in a straight line to Yon, immediately turns around, and returns to Hither. The time for this round trip is 2 hours. The magnitude of the average velocity of the car for this round trip is:

(A) 0 ●

(B) 50 km/hr

(C) 100 km/hr

(D) 200 km/hr

(E) cannot be calculated without knowing the acceleration

$v = \frac{\Delta x}{t} = \frac{x_f - x_i}{t} = 0$

Since the car returns to its original position, the displacement is zero. Thus, the velocity is also zero.

5. A car starts from Hither, goes 50 km in a straight line to Yon, immediately turns around, and returns to Hither. The time for this round trip is 2 hours. The average speed of the car for this round trip is:
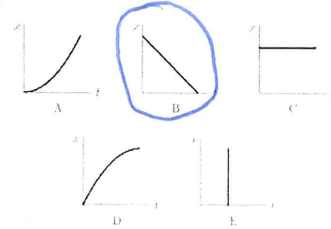
(A) 0

(A) 50 km/hr

$$\text{Speed} = \frac{\text{distance}}{\text{time}} = \frac{50 + 50}{2} = \boxed{50 \frac{km}{h}}$$

(C) 100 km/hr

(D) 200 km/hr

(E) cannot be calculated without knowing the acceleration

6. Which of the following five coordinate versus time graphs represents the motion of an object moving with a constant nonzero speed?

(A) A

(B) B

(C) C

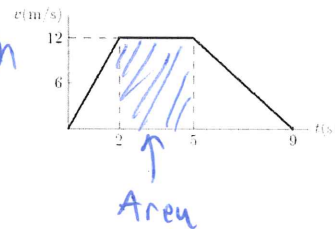(D) D

(E) E

B has a constant slope that is not zero slope.

7. The graph represents the straight line motion of a car. How far does the car travel between t = 2 s and t = 5 s?
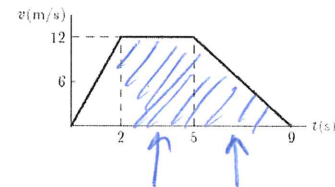
(A) 4 m

(B) 12 m

(C) 24 m

(D) 36 m

(E) 60 m

$$\text{Area} = bh = (3)(12) = 36m$$

base height

Area

8. The graph represents the straight line motion of a car. How far does the car travel between t = 2 s and t = 9 s?

(A) 4 m

(B) 24 m

(C) 36 m

(D) 12 m

(E) 60 m

$$\text{Area} = 36 + \frac{1}{2}(4)(12) = \boxed{60m}$$

9. The vectors a, b, and c are related by c = b + a. Which diagram below illustrates this relationship?

(A) A

(B) B

(C) C

(D) D

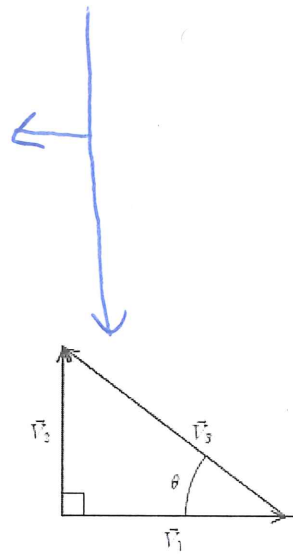(E) E

Vectors are not on the 2016 test.

10. The vector "-A" is

(A) greater than A in magnitude

(B) less than A in magnitude

(C) in the same direction as A

(**D**) in the direction opposite to A

(E) perpendicular to A

11. The vector V_2 in the diagram is equal to:

(A) $V_1 - V_3$

(**B**) $V_1 + V_3$

(C) $V_3 - V_1$

(D) $V_1 \cos\theta$

(E) $V_1/(\cos\theta)$

12. What does the slope of a position graph represent?

(A) Distance

(B) Displacement

(C) Speed

(**D**) Velocity

(E) Acceleration

13. What does the area under the curve of a velocity graph represent?

(A) Distance

(**B**) Displacement

(C) Speed

(D) Velocity

(E) Acceleration

14. A car travels 90 km/hr. How long does is take for it to travel 400 km?

(**A**) 4.4 hours

(B) 0.225 hours

(C) 310 hours

(D) 10.3 hours

(E) 1.4 hours

$$V = \frac{\Delta x}{t}$$

$$\Delta x = v \cdot t$$

OR

$$t = \frac{\Delta x}{v} = \frac{400}{90} = \boxed{4.4 \ hr}$$

15. According to the velocity vs. time graph, which of the following statements is true?

(A) the object speeds up

(B) the object slows down

(C) **the object moves with a constant velocity** *(selected)*

(D) the object stays at rest

(E) the object must be falling to thr ground

Handwritten: Value of the y-variable which in this case is velocity does not change

V (m/s) graph with horizontal line vs t (s)

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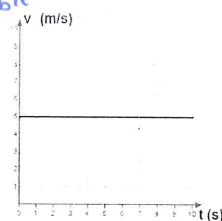
16. Consider these motion diagrams. All balls are moving to the RIGHT. Which of the 6 balls has the greatest displacement over the FIRST 3 SECONDS (From time t=0 to t=3)? If there is a tie among several, select all that apply.

(A) A

(B) B

(C) C

(D) **D** *(selected)*

(E) E

(F) **F** *(selected)*
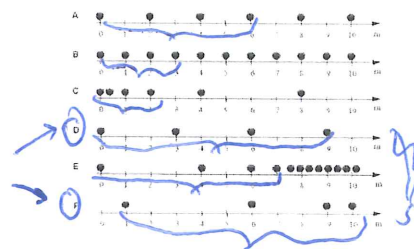
Handwritten: Same displacement

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17. Provided the position vs. time graph, which of the following is true?

(A) the object increases its velocity

(B) the object decreases its velocity

(C) **the object's velocity stays unchanged** *(selected)*

(D) the object is at rest

(E) more information is required

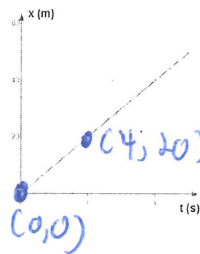*Handwritten:* Velocity is Slope of an X vs. t graph. And the slope does not change

X (m) vs t (s) graph with straight increasing line

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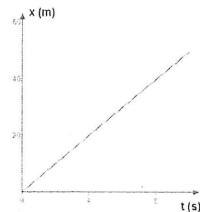
18. What is the velocity of the object at t = 4 seconds?

(A) 4 m/s

(B) 20 m/s

(C) 8 m/s

(D) 40 m/s

(E) **5 m/s** *(selected)*

Handwritten: Find slop However you'd like.
$$V = \frac{\Delta x}{t} = \frac{20}{4} = 5\,m/s$$

X (m) vs t (s) graph through points (0,0) and (4,20)

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19. What is the velocity of the object at t = 0.1221354 seconds?

(A) 4 m/s

(B) 20 m/s

(C) 8 m/s

(D) 40 m/s

(E) **5 m/s** *(selected)*

Handwritten: Since the slope never changed, it is the same as the velocity at t=4 seconds

X (m) vs t (s) graph with straight increasing line

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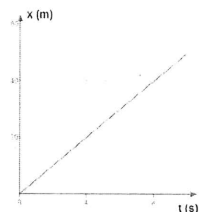
20. What is the displacement from t = 0s to t = 8s

(A) 8 m

(B) 2 m

(C) 6 m

(D) 10 m *(selected)*

(E) 14 m

total area = 10 m

8

Area (0.5)(4) = 2
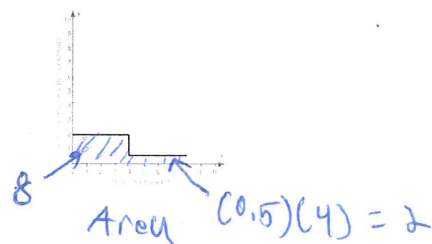
21. In a laboratory experiment, the amount of significant figures recorded for a measurement should be based on

(A) Having at least 3 significant figures

(B) Knowing what the exact value should be

(C) The precision of the instrument making the measurement *(selected)*

(D) Lying

22. With the data provided, what type of relationship exists?

(A) linear

(B) power

(C) inverse *(selected)*

(D) constant

(E) root

½

inverses

Variable 1 (a)	Variable 2 (b)
1.0	177.4
1.5	118.4
2.0	88.2
2.5	70.6
3.0	59.2
3.5	50.8
4.0	43.6
4.5	39.8
5.0	35.0

177.4 = 1
0.66
0.44
0.30
0.33
0.28
0.24
0.22
0.14

23. With the data provided, what is the proportionality?

(A) $b \propto a$

(B) $a \propto sqrt(b)$

(C) $a^2 \propto b$

(D) $b \propto a^{-1}$ *(selected)*

(E) $a \propto b^{-2}$

those symbols are supposed to be

$\propto$

Variable 1 (a)	Variable 2 (b)
1.0	177.4
1.5	118.4
2.0	88.2
2.5	70.6
3.0	59.2
3.5	50.8
4.0	43.6
4.5	39.8
5.0	35.0

24. Which equation best depicts the relationship between the variables?

(A) $b = 177.67\ a^{-1} - 0.273$ *(selected)*

(B) $b = 177.67\ a^2 - 0.273$

(C) $b = -30.5\ a^{-1} + 167.3$

(D) $b = -30.5\ a^2 + 167.3$

(E) $b = 54.4\ a^{-1} + 27.6$

Linearize by flipping the "a" variables then place a linear regression.

Variable 1 (a)	Variable 2 (b)
1.0	177.4
1.5	118.4
2.0	88.2
2.5	70.6
3.0	59.2
3.5	50.8
4.0	43.6
4.5	39.8
5.0	35.0