12
Answer Section

MULTIPLE CHOICE

1. ANS: A
   A.

   PTS: 1
2. ANS: C PTS: 1 DIF: I OBJ: 1-1.1
3. ANS: C PTS: 1 DIF: I OBJ: 1-1.1
4. ANS: B PTS: 1 DIF: I OBJ: 1-1.2
5. ANS: C PTS: 1 DIF: I OBJ: 1-1.2
6. ANS: A PTS: 1 DIF: I OBJ: 1-1.2
7. ANS: D PTS: 1 DIF: I OBJ: 1-1.3
8. ANS: C PTS: 1 DIF: II OBJ: 1-2.1
9. ANS: B PTS: 1 DIF: II OBJ: 1-2.3
10. ANS: D
    Solution

$$\begin{array}{r} 21.4 \\ 15. \\ 17.17 \\ +4.003 \\ \hline 57.573 \end{array}$$

Answer rounds to 58 and is written as 5.8×10^1 in scientific notation.

    PTS: 1 DIF: IIIA OBJ: 1-2.4
11. ANS: B PTS: 1 DIF: II OBJ: 1-3.1
12. ANS: C PTS: 1 DIF: II OBJ: 1-3.1
13. ANS: B
    Solution

$$m\frac{(\Delta x)^2}{(\Delta t)^2} = (\text{kg}) \times \frac{(\text{m}^2)}{(\text{s}^2)} = \text{kgm}^2/\text{s}^2$$

    PTS: 1 DIF: IIIA OBJ: 1-3.3
14. ANS: A PTS: 1 DIF: I OBJ: 2-1.1
15. ANS: C PTS: 1 DIF: I OBJ: 2-1.1
16. ANS: C PTS: 1 DIF: I OBJ: 2-1.1
17. ANS: B PTS: 1 DIF: I OBJ: 2-1.1
18. ANS: C PTS: 1 DIF: I OBJ: 3-1.1
19. ANS: B PTS: 1 DIF: II OBJ: 3-1.1
20. ANS: C

Given
$\mathbf{v}_1$ = 10.0 m/s south
$\mathbf{v}_2$ = 2.5 m/s north

Solution
$v_R = v_1 - v_2 = 10.0\ \text{m/s} - 2.5\ \text{m/s} = 7.5\ \text{m/s}$
$\mathbf{v_R}$ = 7.5 m/s south

PTS: 1 DIF: IIIA OBJ: 3-1.2

21. ANS: C PTS: 1 DIF: I OBJ: 3-2.1
22. ANS: C PTS: 1 DIF: I OBJ: 3-2.3
23. ANS: D PTS: 1 DIF: I OBJ: 4-1.1
24. ANS: D PTS: 1 DIF: II OBJ: 4-1.2
25. ANS: D PTS: 1 DIF: I OBJ: 4-2.3
26. ANS: A

Given
$F_{applied}$ = 6.8 N
m = 31 kg

Solution
$F_{net} = \sum F_x = F_{applied} = ma_x$

$$a_x = \frac{F_{applied}}{m} = \frac{6.8\ \text{N}}{31\ \text{kg}} = 0.22\ \text{m/s}^2$$

PTS: 1 DIF: IIIA OBJ: 4-3.2

27. ANS: B

Given
$F_{g,book}$ = 5 N
μ_s = 0.2

Solution
$\Sigma F_x = F_{applied} - F_{s,max} = 0$

$F_{applied} = F_{s,max} = \mu_s F_n = \mu_s F_g$

$F_g = (5\text{N} + 5\text{N} + 5\text{N} + 5\text{N} + 5\text{N}) = 25\text{N}$

$F_{applied} = (0.2)(25\text{N}) = 5\text{N}$

PTS: 1 DIF: IIIA OBJ: 4-4.4

28. ANS: A

Given
v_i = 15.0 m/s
Δx = 28.7 m

$g = 9.81 \text{ m/s}^2$

Solution

$\Sigma F_x = F_{applied} - F_{s,max} = 0$

$F_{s,max} = F_{applied}$

$\mu_s mg = ma$

$\mu_s = \dfrac{a}{g}$

Because $v_f = 0$, $a = \dfrac{-(v_i)^2}{2(\Delta x)}$

$a = \dfrac{-(15.0 \text{ m/s})^2}{2(28.7 \text{ m})} = -3.92 \text{ m/s}^2$, so the magnitude of $a = 3.92 \text{ m/s}^2$

$\mu_s = \dfrac{a}{g} = \dfrac{3.92 \text{ m/s}^2}{9.81 \text{ m/s}^2} = 0.400$

PTS: 1 DIF: IIIB OBJ: 4-4.4

29. ANS: A PTS: 1 DIF: I OBJ: 5-2.1
30. ANS: D PTS: 1 DIF: I OBJ: 5-2.3
31. ANS: D PTS: 1 DIF: I OBJ: 5-3.1
32. ANS: D PTS: 1 DIF: I OBJ: 5-4.1
33. ANS: A PTS: 1 DIF: I OBJ: 6-1.2
34. ANS: D PTS: 1 DIF: I OBJ: 6-1.3
35. ANS: A

Given

$p_i = 4.0 \text{ kgm/s}$

$p_f = -4.0 \text{ kgm/s}$

Solution

$\Delta p = p_f - p_i = (-4.0 \text{ kgm/s}) - 4.0 \text{ kgm/s} = -8.0 \text{ kgm/s}$

PTS: 1 DIF: II OBJ: 6-1.3

36. ANS: B PTS: 1 DIF: II OBJ: 6-2.1
37. ANS: A PTS: 1 DIF: II OBJ: 6-2.1
38. ANS: B PTS: 1 DIF: II OBJ: 6-2.2
39. ANS: D PTS: 1 DIF: I OBJ: 6-3.1
40. ANS: C PTS: 1 DIF: I OBJ: 6-3.1
41. ANS: B PTS: 1 DIF: I OBJ: 6-3.3

SHORT ANSWER

44. ANS:

9.2×10^8 dm

Solution

$$\left(92 \times 10^3 \text{ km}\right)\left(\frac{10^4 \text{ dm}}{1 \text{ km}}\right) = 92 \times 10^7 \text{ dm} = 9.2 \times 10^8 \text{ dm}$$

PTS: 1 DIF: IIIA OBJ: 1-2.2

45. ANS:
1×10^{-6} m

Solution

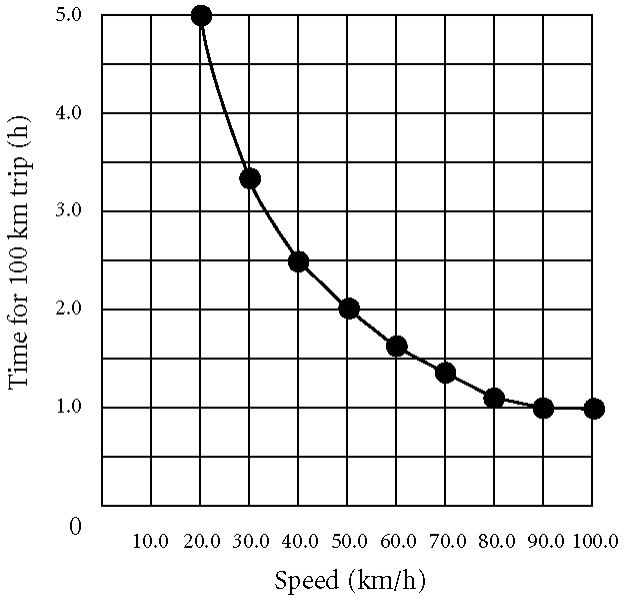
$$\left(1 \text{ μm}\right)\left(\frac{10^{-6} \text{ m}}{1 \text{ μm}}\right) = 1 \times 10^{-6} \text{ m}$$

PTS: 1 DIF: IIIA OBJ: 1-2.2

46. ANS:
Any two of the following: summarize data; describe the relationship between variables; reproduce a graph; make predictions

PTS: 1 DIF: I OBJ: 1-3.1

47. ANS:



PTS: 1 DIF: II OBJ: 1-3.1

48. ANS:
The car is at rest (not moving).

PTS: 1 DIF: I OBJ: 2-1.1

49. ANS:
displacement

PTS: 1 DIF: I OBJ: 2-1.1

50. ANS:
The magnitudes of the displacements are equal, but the displacements are in opposite directions. Therefore, one displacement is positive and one displacement is negative.

PTS: 1 DIF: II OBJ: 2-1.1

51. ANS:
A scalar quantity is a quantity that has only magnitude.

PTS: 1 DIF: I OBJ: 3-1.1

52. ANS:
Average speed is a scalar quantity.

PTS: 1 DIF: I OBJ: 3-1.1

53. ANS:
force

PTS: 1 DIF: I OBJ: 4-1.1

54. ANS:
newton

PTS: 1 DIF: I OBJ: 4-1.1

55. ANS:
The object experiences an acceleration.

PTS: 1 DIF: I OBJ: 4-2.1

56. ANS:
net force

PTS: 1 DIF: I OBJ: 4-2.1

57. ANS:
everyday meaning

PTS: 1 DIF: I OBJ: 5-1.1

58. ANS:
scientific meaning

PTS: 1 DIF: I OBJ: 5-1.1

59. ANS:
Work is equal to the magnitude of the component of a force parallel to the displacement of an object multiplied by the displacement of the object.

PTS: 1 DIF: I OBJ: 5-1.2

60. ANS:
Work is a scalar quantity.

PTS: 1 DIF: I OBJ: 5-1.2

61. ANS:
Power measures how much work is done in a given time interval. In other words, power is the rate of work.

PTS: 1 DIF: I OBJ: 5-4.1

62. ANS:
The 20 kW motor does twice as much work in the same amount of time.

PTS: 1 DIF: II OBJ: 5-4.3

63. ANS:
The student has the least momentum when dodging the opening door.

PTS: 1 DIF: I OBJ: 6-1.2

64. ANS:
Yes, a spaceship traveling with constant velocity could experience a change in momentum if its mass changed, for example, by burning fuel, or if it is acted upon by an outside force.

PTS: 1 DIF: II OBJ: 6-1.3

65. ANS:
inelastic

PTS: 1 DIF: I OBJ: 6-3.1