

HOMEWORK, HW 3-2D MOTION

$$\Rightarrow 1.02 + \frac{342.25 \sin^2 26.0}{19.6}$$

$$= 4.38 \text{ m}$$

1. False (B)

6. True (A)

2. True (A)

7. False (B)

3. False (B)

8.

4. False (B)

5. True (A)

9. False (B)

6. False (B)

10. True (A)

7. False (B)

11. False (B)

8. True (A)

12. A. False

13. True (A)

B. True

14.

C. True

15. True (A)

D. False

16. False (B)

E. False

17. True (A)

19. Velocity on X-axis

$$X\text{-velocity} = 18.5 \cos 26$$

$$= 16.97846$$

$$\approx 1.66 \times 10^1 \text{ m/s} \quad (\text{B})$$

20. Range = Vt

We first calculate t

$$S = Vt + \frac{1}{2}at^2$$

$$\text{but } Vt = 0$$

$$\text{Therefore, } S = \frac{1}{2}at^2$$

$$219 = \frac{1}{2} \times 9.8 \times t^2$$

$$219 = 4.9t^2$$

$$\therefore t = 6.6853 \text{ sec}$$

$$R = 68.6 \times 6.6853$$

$$= 458 \text{ m} \quad (\text{choice B})$$

18. Maximum Height reached

Solution

$$V_0 = 18.5 \text{ m/s}$$

$$\text{Angle} = 26^\circ$$

$$h_0 = 1.02 \text{ m}$$

$$h_{\text{max}} = h_0 + \frac{V_0^2 \times \sin^2(\theta)}{2 \times g}$$

$$= 1.02 + \frac{18.5^2 \times \sin^2(26)}{2 \times 9.81}$$

$$= 1.02 + 3.3552188$$

$$\approx 4.38 \text{ m} \quad (\text{choice E})$$

21. Angle

Solution

$$R = 24.4$$

$$V_0 = 34 \text{ m/s}$$

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

$$R = \frac{V_0^2 \sin 2\theta}{g}$$

$$=$$

$$\theta = \sin^{-1} \frac{gR}{V_0^2}$$

$$= \sin^{-1} \frac{9.81 \times 24}{1456}$$

$$\sin^{-1} 0.10183391$$

$$\approx \sin^{-1} 0.102 = 5.85^\circ \approx 5.9^\circ \quad (\text{D})$$

22. True (A)

23. False (B)

24. True (A)

25. False (B)

26. False (B)

27. $V^2 = U^2 + 2as$

$$0^2 = U^2 + 2 \times -9.8 \times 7.8$$

$$\therefore U^2 = 152.88$$

$$U = \sqrt{152.88} = 12.364465$$

$$V = U + at$$

$$0 = 12.364465 + -9.8 \times t$$

$$9.8t = 12.364465$$

$$t = 1.26168 \text{ sec}$$

$$R = Ut$$

$$8.7 = 1.26168U$$

$$U = \frac{8.7}{1.26168} = 6.89557$$

$$\approx 6.90 \text{ m/s (A)}$$

28. (3) (C)

29. (2) (B)

30. E (None of the above)

31. E (None of the above)

32. 1 (A)

33. False (B)

34. True (A)

35. False (B)

36. True (A)

37. True (A)

END OF

HOMEWORK 3

HOMEWORK, HW 4 - LAWS OF MOTION

HW 4

1. False (B) 3. True (A)

2. False (B) 4. False (B)

5. Force = Mass x Acceleration

$$\Rightarrow F = Ma$$

$\downarrow \quad \downarrow$
 Mass Acceleration

Let $F = f$

Small mass = m

big mass = $2m$

We know $a = \frac{\text{Force}}{\text{Mass}}$

$$a_1 = \frac{f}{m}, a_2 = \frac{f}{2m}$$

$$\therefore \cancel{m}a_1 = 2\cancel{m}a_2$$

Therefore the ratio is 1:2

Therefore it is $\frac{1}{2}$

$\Rightarrow$ Smaller by a factor $\frac{1}{2}$ (E)

6. D

$$7. 1 \text{ mile/hour} = 0.44704 \text{ m/s}$$

$$148 \text{ mile/hour} = 66.1619 \text{ m/s}$$

Solution

$$\text{Force} = 9.30 \text{ E} + 5 \text{ N} = 9.30 \times 10^5 \text{ N}$$

$$\text{Acceleration} = \frac{V_f - V_i}{t}$$

$$\text{Acceleration} = \frac{66.1619 - 0}{2.02}$$

$$= 32.75341584 \text{ m/s}^2$$

Force = Mass x Acceleration

$$F = Ma$$

$$\therefore M = \frac{F}{a}$$

$$= \frac{9.30 \times 10^5}{32.75341584}$$

$$= 28393.98506$$

$$\approx 2.84 \times 10^4 \text{ kg (B)}$$

8. Force = 253 N

$$\text{Acceleration} = 2.20 \text{ m/s}^2$$

Mass = ??

Solution

Force = Mass x Acceleration

$$\Rightarrow F = Ma$$

$$\therefore M = \frac{F}{A} = \frac{253}{2.20}$$

$$= 115$$

$$= 115 \text{ kg (D)}$$

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HOMEWORK, HW-4 CONTINUED

9. Force = Coefficient $\times$ Mass $\times$ gravity

$$F = \mu Mg$$

$$\mu = 0.304$$

$$M = 33.7 \text{ kg}$$

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

$$F = \mu Mg = 0.304 \times 33.7 \times 9.81$$

$$= 100.5014$$

$$\approx 100$$

$$= 1.00 \times 10^2 \text{ N}$$

(E)

10. $F = \mu Mg$

$$\mu = 0$$

$$m = 33.7$$

$$g = 9.8$$

$$F = 0 \times 33.7 \times 9.8 = 0$$

$$= 0 \text{ (A)}$$

11. $F = Ma$

$$\mu_s = 0.360$$

$$\mu_{\text{kinetic}} = 0.124$$

$$\text{Mass} = 4.68 \text{ kg}$$

$$g = 9.81$$

$$\text{Force} = \mu_s Mg$$

$$= 0.36 \times 4.68 \times 9.81$$

$$= 16.52788$$

$$\approx 1.65 \times 10^1 \text{ N}$$

12. Net Force

$$\text{Force Net} = \mu_s Mg - \mu_k Mg$$

$$= (0.36 \times 4.68 \times 9.81) - (0.124 \times 4.68 \times 9.81)$$

$$= 16.527888 - 5.6929392$$

$$= 10.8349488$$

$$\approx 1.08 \times 10^1 \text{ N (C)}$$

13. Force = Mass $\times$ gravity $\times \cos \theta$

$$F = Mg \cos \theta$$

$$= 2.95 \times 9.81 \times \cos 31.2$$

$$= 24.7538$$

$$\approx 2.48 \times 10^1 \text{ (C)}$$

14. True (A)

15. False (B)

16. True (A)

17. False (B)

18. True (A)

19. False (B)

20. False (B)

21. False (B)

22. True (A)

23. False (B)

24. ~~True (A)~~ False (B)

25. True (A)

26. False (B)

27. False (B)

28. Elevation increase
= 3.14 m per every 100 m
horizontal distance.

$$\theta = \tan^{-1}\left(\frac{3.14}{100}\right) = 1.79849^\circ$$

$$\text{Mass} = 419 \text{ kg}$$

$$\text{Force} = \text{Mass} \times \text{gravity} \times \sin(1.79849^\circ)$$

$$= 419 \times 9.81 \times \sin 1.79849^\circ$$

$$= 129.002 \text{ N}$$

$$\approx 1.29 \times 10^2 \text{ N (E)}$$

END OF HOMEWORK 4

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get in touch if you need
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