SOLUTIONS TO QUESTIONS

CHAPTER 1

Practice questions 1a

1. (i) 2700 N
   (ii) 2609 N
   (iii) 1920.9 N
   (iv) 1069.8 N
   (v) 300 N

2. (i) 90.0Â°
   (ii) 36.9Â°

3. b Resultant increases
   c (i) 163 N
   (ii) 184.31 N

4. 8.94 ms^{-1}; 26.6Â°

5. 15.6 km h^{-1}; North 42Â°West

Practice question 1b

1. (i) R_r = 433 N; R_x = 250 N
   (ii) R_y = 500N; R_x = 0.0 N
   (iii) R_y = 250 N R_x = 433 N

2. (a) 573.4 N; 401.5 N
   (b) 1573 N

3. (a) (i) 750.0 N
   (ii) 12990.4 N
   (b) 750 N acting along the plane of the hill. This is the component in the direction of motion of the bus.

4. Resultant = 34 N; Direction = 60Â° from 34 N

5. (i) 25.6 N; 38.62Â°
   (ii) 31.1 N; 47.2Â°
   (iii) 14.1 N; 53.6Â°. 15.36 N; 47.59Â°

Past questions

Objectives

1. B
2. B
3. D
4. A
5. D
6. B
7. A
8. D
9. E
10. B
11. B
12. C
13. A
14. C

CHAPTER 2

Practice questions 2a

1a. 4000m; b. 0.33 m s^{-2}; 0.5 m s^{-2} c. 8000 m; d. 26.7 m s^{-2}

2a. 10 m s^{-1}; b.(i) 20.10 m s^{-1};
(ii) 3.09 m s^{2};
3. 20 seconds.
4. 43.6 seconds; 0.34 m s^{-2};
5. (a) 24 m s^{-2};
(b) 25 m;
(c) 2.5 seconds.
6. 0.75m s^{-2};350m.
7. 0.42 m s^{-2}; 350 m.

Practice questions 2b

1b. (i) 10 m s^{-1};
(ii) 36.9Â°;
(iii) 1.8 m;
(iv) 12 s;
(v) 9.6 m

2b. (i) 750 J;
(ii) 7.07 s;
(iii) 70.7 m s^{-1};

3b. (i) 8 s;
(ii) 320 m

4. (i) 140m;
(ii) 9.29 s;
(iii) 643.6 m

5b. (i) 5 m;
(ii) 2 s;
(iii) 10 m s^{-1};

6b. (i) 10 m s^{-2};
(ii) 40 m s^{-1};
(iii) 160 m

7. t = 2.0s; s = 20.0 m

Past questions

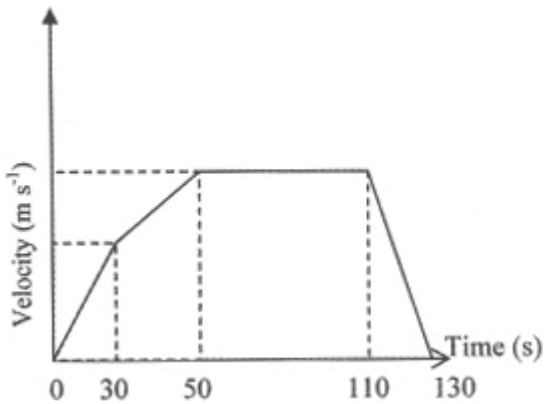
Objectives

1. C
2. B
3. D
4. D
5. D
6. B
7. D
8. C
9. C
10. A
11. B
12. D
13. E
14. B
15. A
16. C
21. 1.5s
22. 31.25m
23. 39.44m
24. 0.86m
25. 0.8s
26. 30Â°

Essay

17c. (i) 240 m s^{-1};

(ii) 97 m s^2;
(iii) 7400 m;
(iv) 148 m s^{-1}



18c. (i) PQ = 150 m;
(ii) 5.0 s;
(iii) 10.0 s

19b.

t(s^{-1})	1	2	3	4	5	6
s(m)	5	20	45	80	125	180

Distance

19c. (i) 40 m s^{-1};
(ii) 156.03 m

20c. (i) t = 1 seconds for the first stone;
t = 3 seconds for the second stone
(ii) v = 10 m s^{-1}; stone moving down.

21b. 1.5 sec;

22b. 31.25m;

23b. 39.4 m s^{-1};

25. 0.8 sec;

26. (i) 60Â°;
    (ii) 5.2 sec;
    (iii) 77.94 m;
    (iv) 5.98 m s^{-1}.

27b. 39.4 m s^{1}; 37b. 0.8 s;

28 (i) 14.5Â°
    (ii) 1.5 s
    (iii) 43.6 m
    (iv) -12.5 m s^{-1}

CHAPTER 3

Practice questions 3a

lc. 58 N opposite to the applied force

2b. (i) 205N;
    (ii) 10.1 N

3b. (i) T = 636.4 N; P = 450 N
    (ii) T_1 = 1464.1 N; T_2 = 1793.2 N

Practice questions 3b

1c. 500 N;

2c. 35000 N, 35000 N;

3c. 450 N

4b. 32.5 Nm

Practice question 3c

5b. 1.15cm from the old C.G.

Pastor questions

Objectives

1. B
2. B
3. D
4. A
5. D
6. D

7. A
8. C
9. E
10. D
11. B
12. A
13. A
14. E
15. D
16. A
17. B
18. B
19. C
20. C
21. D
22. A
23. D
24. C
25. B
26. C
27. B
28. D

Essay

29b. (i) 45 g
(ii) 0.75 N; 30c.
(i) 80g;
(ii) 33cm;

31c. 0.00240 m from the end of the cut off circular disc.

32c. 0.25 cm from the end of the cut off circular disc.

33c. (i)17N;
(ii) 6.0 Ã— 10^{-4} m^3;
(iii) 2166.67 Ã— 10^{-3} kg m^{-3}

34. 2.56 N

CHAPTER 4

Practice questions 4a

1c (i) 62500 N m^{-2}

(ii) 125000 N m^{-2};

2c (i) 2222.2 N m^{-2};
(ii) 5656.57 N m^2;

3c. 7.81 Ã— 10^4N m^2

Practice questions 4b

1d. 1562510 N m^{-2};

2d. 117.2 k Pa;

Practice questions 4c

1b. (i) 50000 Pa
(ii) 5000 N;

1c. 4500 N

2b. (i) 1 Ã— l0^6Pa
(ii) 5000 N

Past questions

Objectives

1. E
2. A
3. E
4. D
5. A
6. A
7. D
8. E
9. A
10. B
11. E
12. C
13. A
14. D
15. D
16. B
17. B
18. A
19. D
20. A
21. B

Essay

1b. 1.315 Ã— $10^{-7}Nm^{-2}$;

2b. 3.2;

2c. 9.17 Ã— $10^{7}Pa$

CHAPTER 5

Practice questions 5a

1c. (i) 3.0 rad s^{-1}
(ii) 0.3 m s^{-1}
(iii) – 0.9 m s^{-1}

2. 200 rad^{-1}

3c. (i) 0.12 m
(ii) 4*Ï€* rad s^{-1} or 12.6 rad s^{-1}
(iii) 1.51 m s^{-1}
(iv) -18.95 m s^{-1}
(v) 0.5 s
(vi) 2.0 Hz

4b. (i) 0.5 *Ï€* m s^{-1} or 1.57 m s^{-1}
(ii) 0.46 *Ï€* m s^{-1} or 1.44 m s^{-1}
(iii) 5 $Ï€^2$ m s^{-2} or 49.3 m s^{-1}
(iv) 0.2 s

Practice questions 5b

1c. (i) 1.013 m;
(ii) 5.7Â°
(iii) 2.5 Ã— $10^{-3}J$

2c. (i) 0.25 m s^{-1}
(ii) 4.97 s

3. 075 m s^{-1} ; 0.0844 J; 4b. 3.93 m

5a. 1.987 s

5b. 59.6 s

Past questions

Objemctives

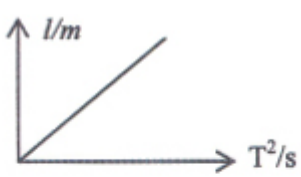
1. C

2. D
3. D
4. B
5. C
6. A
7. D
8. B
9. B
10. B
11. E
12. B
13. C
14. A
15. B

Essay

16c. (i) 0.4m s^{-1}
(ii) *Ï€*s or 3.142 s
(iii) 0.2 m s^{-1}

17b. (i)



(ii) Slope = $\frac{g}{4\pi^2}$

(iii) g = Slope x 4 $\pi^2 = 9.87\,m s^{-2}$

18b. (i) $\sqrt{\frac{k}{m}} = \omega$ = angular speed.

(ii) (I) 3.375 x 10^7J (II) 0.45 N

CHAPTER 6

Practice questions

5b. (i) 9 kg m s^{-1}
(ii) 8 kg m s^{-1}
(iii) 1 kg m s^{-1}
(iv) 2 N

6. 75,000 N;

7a. 3.0 m s^{-2};

7b. 4500 N

8a. (i) 15,000N;
(ii) 10m s^{-2}.
(iii) Acceleration decreases to 8.57 m s^{-2}
(iv) 3,750,000 J;

9c. 600 N

Practice questions 6b

1b. 0 m s^{-1} and 4.0 m s^{-1} respective
(ii) 80 N

2b. 10 m s^{-1}

3b (i) 160,000 kg m s^{-1}
(ii) 40,000 N
(iii) The impact force increases as the impart time increases.

4b. 2.6 m s^{-1}; 245.03 J

5b. 2m s^{-1};
(ii) 4m s^{-1};
(iii) 0 N;
(iv) 0 m s^{-2};

6. (i) 15 kg m s^{-1};
(ii) 5m s^{-1};
(iii) 750N

7. (i) 6.0 kg m s^{-1}; 4.8 kg m s^{-1};
(ii) 1.2 kg m s^{-1};
(iii) 1.2 N s
(iv) 120 N

Past questions

Objectives

1. D
2. C
3. A
4. C
5. B
6. D
7. B
8. C

9. B
10. C
11. D
12. D
13. C
14. C
15. D
16. C
17. B
18. C
19. E
20. B
21. D
22. C
23. A
24. C
25. C

Essay

26c. (i) 2 m s^{-1}
(ii) 7.5 Ã— 10^3 J
(iii) 5 Ã— 10^3 N s

27 (ii) 150 N s

28b. 4 m s^{-1};

28d. 2.18 m s^{-2}

29. (i) 24 N
(ii) 1.0 m

30. (i) 173.21 N
(ii) 200 N

31. (i) 5 m s^{-1}
(ii) 129.9 N

32. (i) 800 N
(ii) 820 N

33. (i) 7.75 m s^{-1}
(ii) 38.75 kg m s^{-1}
(iii) 21.1 N

34c. (i) 13 J
(ii) 3.163 m s^{-1}
(iii) 1.47 m s^{-1}

CHAPTER 7

Practice question 7a

1c. 4

2c. (i) 6500 J
(ii) 8125 J
(iii) 4
(iii) 162.5 N

4c. (i) 1200J
(ii) 3000J
(iii) 80%
(iv) 4

5 (i) 7.5 N
(ii) 5175 J;

6c. 4

7c. (i) 6500 J
(ii) 8125 J
(iii) 4
(iv) 162. 5N

8b. (i) 3
(ii) 4
(iii) 150 J; 200 J
(iv) 75%

9c. (i) 12,000 J
(ii) 3000 J
(iii) 80%
(iv) 4

Practice questions 7b

1c. (i) V.R. = 4
(ii) M.A. = 1.67
(iii) 41.75%

2b. (i) M.A. = 3; Eff. = 75%

(ii) M.A. = 4; Eff. = 66.7%
(iii) M.A. = 4; Eff. = 80%

3b. (i) V.R. = 4
(ii) M.A. = 3
(iii) Eff. = 75%
(iv) 6643 J

4c. (i) 4000 J
(ii) 80%

5b. (i) M.A. = 5
(ii) V.R. = 6.26
(iii) 125 cm
(iv) 6284 J

6c. (i) V.R. = 3
(ii) 3 rev. per second.
(iii) M.A. = 2.4

7. (i) V.R. = 6
(ii) M.A. = 3.6
(iii) 180 N

8b. 19.1%

9b. (i) 750 J
(ii) 50% 10c. 2000 N

Past questions

Objectives

1. C
2. B
3. A
4. C
5. A
6. D
7. B
8. D
9. D
10. D
11. B
12. B
13. C
14. A

15. C
16. C
17. C
18. C
19. D
20. B
21. C

Essay

22d. (i) V.R. = 628
(ii) M.A. = 157
(iii) Effort = 6.4 N

23c. (i) 800 N
(ii) V.R. = 2
(iii) M.A. = 0.875
(iv) Eff. = 43.75%
(v) 2250 J
(vi) 1750 J
(vii) 35 watts

24c. (i) VR. = 100
(ii) M.A. = 80
(iii) 1000N
(iv) 16,000 J

CHAPTER 8

Practice questions 8a

1b. (i) 4000 J
(ii) 396900 J
(iii) 554400 J

2d. 53Â°C

3b. 0.03 kg

4b. (i) 3.0 kg
(ii) 57,000 J

5c. (i) 360000 J
(ii) â‰ˆ 12.0 kg

6. (i) 750000 J

(ii) 657.9Â°C

Practice questions 8b

1. 168000 J;

2. 189000 J

3. 52425 J

4. 4856000 J

5. 54000 J

6c. 28.4 g

7c. 7.68g

Practice questions 8c

7c. 22.8 g

Past questions

Objectives

1. A
2. C
3. B
4. C
5. C
6. B
7. D
8. C
9. B
10. B
11. A
12. B
13. E
14. B
15. B
16. A
17. A
18. A
19. C
20. B
21. D
22. B
23. D

24. C
25. D
26. C
27. C
28. C

Essay

29. 2290.9 J kg^{-1} k^{-1};

30c. 38.3Â°C

31. 22680000 J kg^{-1};

34. 2100000 J kg^{-1}

37c. 0.3 g;

38. 1.15 kg;

39c.68%;

40c. 33.3%;

41d.l23g

CHAPTER 10

Practice questions 10a

4. (i) 90 cm Hg; 71 cm Hg
   (ii) 96 cm Hg

7. 0.93 m^3;

8. (i) 0.01g m^{-3}
   (ii) 677.6 cm^{-3}; 0.015 g m^{-3}

9. (i) H = 75 cm Hg;
   (ii) 90 cm Hg; 60 cmHg

Practice questions 10b

1c. 28878 cm^3;

3c. 3.193 Ã— 10^5 Pa

Practice questions 9c

1b. 1316.34cm^3;

4b. 5.1 atm; 51.87cm^3

Past questions

Objectives

1. B
2. D
3. D
4. A
5. D
6. D
7. D
8. C
9. A
10. D
11. B
12. B
13. C
14. A
15. A
16. D
17. C
18. D
19. C
20. C

Essay

21b. 0.00365 k^{-1} 23.(i) 23.95 cm
(ii) 29.84 cm

24. 104144 Pa

CHAPTER 11

Practice questions 10a

1b. 1 m s^{-1};

5c. 282 m; 7
(iii) 0.2 m;

8b. (i) â‰ˆ 3.0m
(ii) 1 Ã— 10^8Hz
(iii) 3 Ã— 10^8m s^{-1}

9b. (i) 0.1 m
(ii) 0.01 s
(iii) 10 m s^{-1}

Practice questions 11b

3b. (i) 1.67Hz;
(ii) 1.25;
(iii) 20 cm s^{-1}

Past questions

Objectives

1. B
2. D
3. B
4. C
5. C
6. C
7. B
8. A
9. B
10. D
11. B
12. A
13. D
14. C
15. D
16. D
17. A
18. C
19. B
20. C
21. E
22. C
23. D
24. E
25. D
26. E
27. D
28. D
29. D

Essay

30b. 8 Hz

31. (i) 100 Hz
(ii) 4.0cm
(iii) 400 cm s^{-1}

35c. (i) 0.64 Hz
(ii) 1.57s
(iii) 1.34 m s^{-1}

CHAPTER 12

Practice questions 12a

3c. 1.50 cm;

5b. 1.5 Ã— $l0^{13}$m

Practice question 12b

3b. (i) 4m s^{-1}
(ii) 8.0 m; 5b. 11 images

7b. 50Â°

Practice question 12c

2d. (i) 15 cm;
(ii) 18.75 cm;

4d. 0.251m

5c. (i) 15 cm;
(ii) 3
(iii) 15cm

Past questions

Objectives

1. A
2. C
3. C
4. C
5. C
6. A
7. A
8. B
9. E

10. C
11. A
12. A
13. B
14. B
15. A
16. A
17. B
18. D
19. D
20. B
21. B
22. D
23. B
24. D

Essay

CHAPTER 13

Practice questions 13a

1c. 1.68

4c. (i) 51.7Â°
(ii) â‰ˆ62Â°
(iii) 36Â°

Practice questions 13b

2b. 2.5 cm;

3c. 1.33

Past questions

Objectives

1. D
1. C
1. C
1. E
1. E
1. D
1. A
1. D
1. D

1. A
1. C
1. B
1. C
1. C
1. E

Essay

16. 5.0 cm

17.48.6Â°

18. 4.0em

19. 1.33

20.48.6Â°

21c. 8 Hz

21d. 19.5Â°

CHAPTER 14

Practice questions 14a

1b. v = 60 cm, h = 40 cm;

2c (i) 12 cm (ii) 48 cm

3c v = 60 cm, U = 20 cm;

4c. (i) 5.0 D
(ii) 60 cm

Past questions

Objectives

1. B
2. B
3. D
4. D
5. D
6. D
7. A
8. A
9. D

10. B
11. B
12. D
13. A
14. C
15. B
16. B
17. D
18. D

Essay

19. (i) 55.0 cm
    (ii) 54.2cm

CHAPTER 15

Practice questions 14a

3c. 1.2 x ^{18} Hz;

6. C

7. D

Past questions

Objectives

1. C
2. B
3. B
4. D
5. B
6. A
7. D
8. B
9. C
10. B

CHAPTER 16

Practice questions 16a

2b. 334 m s^{-1}

6b. 340.9 m^{-1}

Practice questions 16b

4c. (i) 128Hz
(ii) 362Hz; 5c.1.523 Ã— 10^{-4} kg

6c. 25.58 Hz;

7c. (i) 256 Hz
(ii) 0.996 Hz

Practice questions 16c

2b. 0.5 m;

3c. 0.664 m

Past questions

Objectives

1. D
2. C
3. C
4. C
5. C
6. A
7. D
8. D
9. B
10. C
11. E
12. D
13. A
14. C
15. D
16. B
17. A
18. D
19. C
20. C
21. B
22. A
23. A
24. B
25. A
26. A
27. C
28. B

29. D
30. B
31. B
32. B
33. A

Essay

35. (b) 21.2 cm;

37. (c) 5.4 m s^{-1}

38. (d) (i) 1.2 m;
(ii) 4.0x 10^{-3} s

42. a(ii)85 Hz

45a. 0.55 m
(b) (i) 383.3 m
(ii) 333.3 m s^{-1}

46d.(i) 1.2m;
(ii) 4.0 Ã— 10^{-3} s;

47c. 4Hz