

ANSWERS

SET 1

1. 6 200 m 2. 186 s 3. 9 000 s 4. 1.76 m 5. 5.5 kg
6. 0.025 kg 7. 1 500 kg 8. 0.018 m 9. 0.075 m² 10. 0.001 m³

SET 3

1. 216 m S 2. 47 m downfield 3. 13 m S 4. 115 km SW 5. 23 m down

SET 4

1. 280 m S 15° W 2. 560 km W 63° S 3. 45 cm 27° to the horizontal
4. 77 cm 19° to the horizontal 5. 17.1 km N 52° W

SET 5

1. 424 km NW 2. 10 m 53° to the vertical 3. 1 300 m E 67° S
4. 20 m 30° to the horizontal 5. 2 km N 8° E

SET 6

1. 8 m s⁻¹ 2. 25 m s⁻¹ 3. 9 m s⁻¹ 4. 150 m 5. 30 m
6. 324 000 m 7. 14 s 8. 3 s 9. 60 s 10. 8.5 h
11. 20 km 12. 480 km h⁻¹

SET 7

1. (a) 8.8 m s⁻¹ (b) 5.6 m s⁻¹ W (c) 0 2. (a) 350 s (b) 5 km N 53° W
(c) 14.3 m s⁻¹ N 53° W 3. (a) 30 m (b) 1.5 m s⁻¹ 4. (a) 70 s (b) 5 m s⁻¹
5. 3 000 m S 6. 2 m 7. 2 m s⁻¹ 8. 50 s 9. 800 m 10. 14 m s⁻¹

SET 8

1. 1.8 m s⁻¹ 2. 24 m s⁻¹ 3. 32.4 m s⁻¹ 4. 21 m s⁻¹ 5. 2.5 m s⁻²
6. 3 m s⁻² 7. 3 m s⁻² 8. 2 s 9. 20 s 10. 6 m s⁻²

SET 9

1. 3 m s⁻² 2. -10 m s⁻² 3. (a) 27 m s⁻¹ (b) 24 s 4. 110 m s⁻¹
5. 6 s 6. 10 s 7. 6 s 8. 10 m s⁻¹

SET 10

1. (a) 256 m (b) 32 m s⁻¹ (c) 44 m s⁻¹ 2. 14.4 m
3. (a) 30 m (b) 8 m s⁻¹ (c) 5 m s⁻¹ 4. (a) 500 m (b) 20 m s⁻¹ (c) 10 m s⁻¹
5. 46 m 6. (a) 10 m (b) 10 m s⁻¹ (c) 5 m s⁻¹ 7. (a) 25.5 m (b) 0.5 m s⁻¹
8. (a) 120 m (b) 30 m s⁻¹ (c) 10 m s⁻¹ 9. (a) 18 s (b) 648 m
10. (a) 90 m (b) 30 m s⁻¹

SET 11

1. (a) 96 m s⁻¹ (b) 576 m (c) 48 m s⁻¹ 2. (a) 30.5 m s⁻¹ (b) 1.5 m s⁻² (c) 549 m
3. 6 s 4. 25 s 5. (a) -6 m s⁻² (b) 147 m 6. (a) 4.8 m s⁻² (b) 4.8 m s⁻¹
(c) 9.6 m s⁻¹ 7. 6.75 m 8. 4.8 m 9. 200 m 10. 272 m

SET 12

1. (a) 40 m s⁻¹ (b) 80 m 2. (a) 12 m s⁻¹ (b) 7.2 m 3. 31.25 m
4. 4.05 m 5. 75 m 6. (a) 20 m (b) 45 m (c) 25 m

SET 13

1. (a) 35 m s^{-1} (b) 56.25 m 2. (a) 25 m s^{-1} (b) 20 m
 3. (a) 400 m s^{-1} upwards (b) 400 m s^{-1} downwards
 4. 3 m s^{-1} downwards 5. (a) 60 s (b) $18 000 \text{ m}$ 6. (a) 1.6 s (b) 12.8 m
 7. 3 s 8. 4 s 9. (a) 1.6 s (b) 16 m s^{-1} 10. 3.4 s

SET 14

1. (a) (i) 41.4 m (ii) 29.4 m (b) (i) 3.3 s (ii) 7.6 s 2. (a) 0.8 s (b) 8.75 m
 3. (a) (i) 1.5 m s^{-1} (ii) 0.5 m s^{-1} (b) 4 s to 6 s (c) 0 (d) 0 (e) 8 m (f) 1 m s^{-1}
 4. (a) (i) 63.7 m s^{-1} (ii) 88.2 m s^{-1} (b) (i) 1.7 s (ii) 8.2 s
 5. (a) 90 m s^{-1} (b) 1.8 m s^{-2} (c) $31 500 \text{ m}$ (d) -0.9 m s^{-2}

SET 15

1. 21 N 2. 12.5 N 3. $3 200 \text{ N}$ 4. 5 m s^{-2} 5. 1.5 m s^{-2}
 6. 0.33 m s^{-2} 7. 5 m s^{-2} 8. 60 kg 9. $1 400 \text{ kg}$ 10. 0.27 kg

SET 16

1. 16 m s^{-1} 2. (a) 7.5 m s^{-1} (b) 22.5 m 3. (a) 12 m s^{-1} (b) 14.63 m
 4. 6.75 N 5. $8 125 \text{ N}$ 6. $1 120 \text{ N}$ 7. 10 s 8. $-5 000 \text{ N}$
 9. 45.5 m s^{-1} 10. (a) 0.5 m s^{-1} (b) 1 m s^{-1} (c) -0.5 m s^{-2} (d) 1.5 kg

SET 17

1. (a) 520 N (b) 26 N 2. (a) 35 kg (b) 0.5 kg 3. 480 N 4. $10 000 \text{ N}$
 5. 120 kg 6. (a) $8 000 \text{ N}$ (b) 10 m s^{-2} 7. (a) 15 m s^{-1} (b) 22.5 m
 8. 1.6 m s^{-2}

SET 18

1. 16 m s^{-1} NW 2. 2.5 m s^{-2} upwards 3. 550 N NE 4. 0
 5. 890 N S 18° W 6. 240 N downwards 7. 79.5 N E 58° S 8. 0
 9. 232 m s^{-1} W 10. 173 m s^{-1} W

SET 19

1. 878 N E 21° S 2. 202 m s^{-1} E 6° N 3. 37 m s^{-1} N 6° E
 4. 7.5 m s^{-2} NW 5. $4 940 \text{ N}$ at 28°

SET 20

1. 101 m s^{-1} W 9° N 2. 15.8 m s^{-1} at 18° 3. 7.1 m s^{-1} SE
 4. $2 500 \text{ N}$ at 37° 5. 272 N W 54° S

SET 21

1. 540 J 2. $55 000 \text{ J}$ 3. 5 m 4. $4 000 \text{ N}$ 5. 450 J
 6. $150 000 \text{ J}$ 7. 3.3 kg 8. $240 000 \text{ J}$ 9. 3.6 m
 10. (a) 6 J (b) 3.6 J 11. $18 000 \text{ J}$ 12. $2 000 \text{ kg}$

SET 22

1. $1 280 \text{ J}$ 2. $1 000 \text{ J}$ 3. 2 N 4. $64 000 \text{ J}$ 5. 30 m

SET 23

1. 625 J 2. 62.5 J 3. 16 kg 4. 100 m s^{-1} 5. 18 J
 6. $75 000 \text{ J}$ 7. $20 000 \text{ J}$ 8. $18 000 \text{ J}$ 9. $32 000 \text{ J}$ 10. $6 400 \text{ J}$

SET 24

1. $125 000 \text{ J}$ 2. 800 J 3. $1 200 \text{ J}$ 4. 50 m 5. 1.5 J
 6. 45 m 7. 9.2 m 8. 0.4 kg 9. 0.032 m 10. (a) 5 J (b) 40 J

SET 25

1. 4 W 2. (a) 1.5 kJ (b) 50 s 3. $4 800 \text{ kJ}$ 4. 200 W
 5. (a) 5 s (b) $50 000 \text{ J}$ (c) $10 000 \text{ W}$ 6. $4 000 \text{ W}$ 7. $50 000 \text{ W}$
 8. $2 400 \text{ kW}$ 9. 833 m 10. 250 m

SET 26

1. 800 kg m^{-3} 2. (a) 2.7 g cm^{-3} (b) $2.7 \times 10^3 \text{ kg m}^{-3}$ 3. $7 860 \text{ kg m}^{-3}$
 4. 19.3 g cm^{-3} 5. $1 200 \text{ kg}$ 6. $93 600 \text{ kg}$ 7. 0.25 m^3
 8. 4.5 m^3 9. 305 kg 10. 53.5 g

SET 27

1. $1 000 \text{ Pa}$ 2. 10 Pa 3. 50 Pa 4. 0.014 Pa
 5. $3 000 000 \text{ Pa}$ 6. $18 889 \text{ Pa}$, $2 833 \text{ Pa}$ 7. $140 000 \text{ N}$
 8. 0.25 m^2 9. $325 000 \text{ N}$ 10. 0.003 m^2

SET 28

1. $15 000 \text{ Pa}$ 2. $2 800 \text{ Pa}$ 3. $14 000 \text{ Pa}$ 4. 0.4 m
 5. $1 200 \text{ kg m}^{-3}$ 6. $5 500 000 \text{ Pa}$ 7. 1.4 m 8. liquid A
 9. 7.5 m 10. (a) 1.25 kPa (b) 2.00 cm

SET 29

1. 12 L 2. 380 mm Hg 3. 500 kPa 4. 9.4 mL 5. 1600 L
 6. 6.5 L 7. 3.75 atm 8. 7 m^3 9. 250 mL 10. volume $\times 4$

SET 30

1. 423 K 2. 300 K 3. 546 K 4. 190 K 5. 168 K
 6. 4°C 7. 273°C 8. 17°C 9. -63°C 10. -269°C

SET 31

1. 15 L 2. 67 K 3. 60 mL 4. 95.5°C 5. -185.5°C
 6. 10.3 m^3 7. 7.5 L 8. -146°C 9. 6 L 10. 293°C

SET 32

1. 292 kPa 2. -124°C 3. 528 kPa 4. 55 cm Hg 5. 4.8 atm
 6. 10°C (inc) 7. $4 641^\circ\text{C}$ 8. pressure $\times 2$ 9. temp $\times \frac{1}{2}$ 10. -213°C

SET 33

1. 64 kPa 2. 1.37 L 3. 2.38 L 4. 1 atm 5. $1 485^\circ\text{C}$
 6. -23°C 7. 99°C 8. 93 L 9. 280 K 10. 11.1 mL

SET 34

1. 12 V 2. 12 V 3. 960 ohm 4. 6 A
 5. 0.15 A 6. 0.0014 V 7. 83.3 ohm 8. 0.0025 A
 9. 2.1 A 10. (a) 2.45 A (b) 0.43 V

SET 35

1. ${}^4_2\text{He}$ 2. ${}^1_1\text{H}$ 3. ${}^4_2\text{He}$ 4. ${}^{234}_{91}\text{Pa}$ 5. ${}^{95}_{36}\text{Kr}$
 6. ${}^{214}_{84}\text{Po}$ 7. γ -ray 8. ${}^1_0\text{n}$ 9. ${}^{27}_{13}\text{Al}$ 10. ${}^{10}_5\text{B}$

SET 36

1. α - particle 2. bismuth - 214 3. β - particle 4. platinum - 197
 5. proton 6. beryllium - 9 7. γ - ray 8. oxygen - 17
 9. deuteron 10. potassium - 38

SET 37

1. 2 days 2. 11 200 years 3. 2.5 billion 4. (b) 9 800 years (c) 2.5 disint s^{-1}
 5. $4.8 \times 10^{-4} \text{ s}$, $1.35 \times 10^{10} \text{ years}$ 6. 40 decays s^{-1} 7. 3.8 days
 8. (a) 26.25 billion (b) 26.25 billion 9. 8.7 years 10. $4.5 \times 10^9 \text{ years}$

SET 38

1. $4.5 \times 10^{15} \text{ J}$ 2. $5.4 \times 10^{18} \text{ J}$ 3. 9 kg 4. 167 kg 5. 0.44 kg
 6. $3 \times 10^9 \text{ kg}$ 7. $1.05 \times 10^{-7} \text{ kg}$ 8. 0.14 kg

SET 39

1. 2.25 ms^{-1} 2. $7.5 \times 10^{-7} \text{ m}$ 3. 0.017 m 4. $6 \times 10^8 \text{ Hz}$
 5. 4 ms^{-1} 6. 303 m 7. $3 \times 10^{16} \text{ Hz}$ 8. (a) 1.33 m
 (b) 0.0039s 9. 7.5 ms^{-1} 10. (a) 200 Hz (b) 1.7 m

SET 40

1. 333.3 m s^{-1} 2. 5 128 m s^{-1} 3. 2.04 km 4. 102 m 5. 1.6 s
 6. (a) 40 m s^{-1} (b) 80 m (c) 89.7 m 7. 17 m 8. 4 s 9. 1416.7 m s^{-1}
 10. 0.20 s, 2.94 s

SET 41

1. real, inverted, diminished, 30 cm opposite, 5 cm high
 2. real, inverted, same size, 100 cm opposite, 25 cm high
 3. real, inverted, enlarged, 30 cm opposite, 4 cm high
 4. no image
 5. virtual, upright, enlarged, 20 cm same side, 10 cm high
 6. real, inverted, diminished, 100 cm opposite
 7. virtual, upright, diminished, 4 cm same side, 2 cm high
 8. virtual, upright, diminished, 22.2 cm same side, 3.3 cm high
 9. real, inverted, diminished, 0.1 m opposite, 0.02 m high
 10. real, inverted, enlarged, 210 cm opposite, 30 cm high, mag. = 6

SET 42

1. real, inverted, diminished, 37.5 cm same side, 7.5 cm high
 2. real, inverted, same size, 40 cm same side, 10 cm high
 3. real, inverted, enlarged, 11.25 cm same side, 2.5 cm high
 4. no image
 5. virtual, upright, enlarged, 1.5 cm opposite, 1.5 cm high
 6. real, inverted, diminished, 200 cm same side
 7. virtual, upright, diminished, 0.48 m opposite, 0.071 m high
 8. virtual, upright, diminished, 5 cm opposite, 5 cm high
 9. virtual, upright, enlarged, 100 cm opposite, 40 cm high
 10. real, inverted, diminished, 25 cm same side, 2.5 cm high, mag. = $\frac{1}{4}$

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