



END OF YEAR MOCK EXAMINATION SECONDARY THREE PURE PHYSICS (ANSWER KEY)

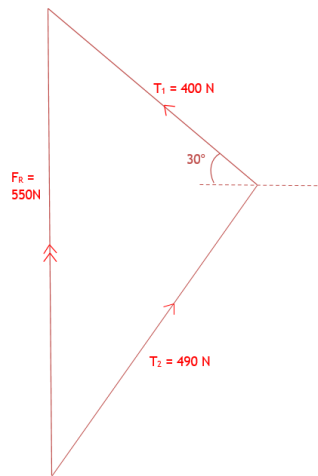
Paper 1

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Paper 2

Question 21

(a)



Scales: 1cm rep 50 N [1]

Correct orientation of vectors in tip-to-tail or parallelogram, resultant force has double arrowhead [1]

Resultant force = 550N [1]

(Accept 540 N to 560 N)

(b) Since body is in equilibrium, weight of circus performer = 550 N [1]

ECF: Must be answer from (b).

Question 22

(a) From $t = 0$ s to $t = 5$ s, the boy's speed/ velocity increases with decreasing acceleration. [1]

From $t = 5$ s to $t = 10$ s, the boy moves at a constant speed / velocity. [1]

(Do not accept: the boy moves with zero acceleration.)

(-1 mark if student does not indicate duration of time.)

(b) Distance = Area under the speed-time graph = $\frac{1}{2} (15 - 10)(4)$ [1]

= 10 m

Question 23

- (a) $m = W / g$
 $= 20 / 10$
 $= 2.0 \text{ kg}$ [1]
- (b) $a = F_{\text{net}} / m$
 $= (50 - 20) / 2.0$ [1]
 $= 15 \text{ m s}^{-2}$ [1] (allow full ecf from part b)
- (c)
- Balloon will decelerate/slow down/has decreasing speed (upwards). [1]
 - Negative acceleration [0] (vague as this could imply many possible scenarios)
 - Acceleration is in negative direction [0] (vague as this could imply many possible scenarios)
 - Net force becomes negative (-10 N) / direction of net force is opposite to direction of motion. [1]
 - Net force is downwards

Question 24

- (a) The principle of moments states that for a body in equilibrium, the sum of clockwise moments about a pivot equals the sum of anti-clockwise moments about the same pivot [1]
- (b) Sum of clockwise moments = sum of anti-clockwise moments
 $6.0 \times 10.4 + 1.0 \times 5.0 = 2.0 \times f$
 $67.4 = 2.0 f$
 $f = 33.7 \text{ N}$ or 34 N [1]
- (c) The moment due to the 6.0 N force will increase. [1]
This is because the perpendicular distance between the hinge and the 6.0 N forces increases as the lever is pushed down. [1]

Question 25

- (a) 76 cm Hg [1]
- (b) Pressure at P = $h\rho g$
 $= (1.00-0.30-0.24) \times 13600 \times 10$ [1]
 $= 62600 \text{ Pa (3 sf)}$ [1]
- (c) There is some air / gas trapped inside the space above the mercury column in barometer B. [1]
- (d) The (vertical) height of the Hg column is unchanged [1]
 The vertical height is dependent only on the atmospheric pressure outside the barometer. [1]

Question 26

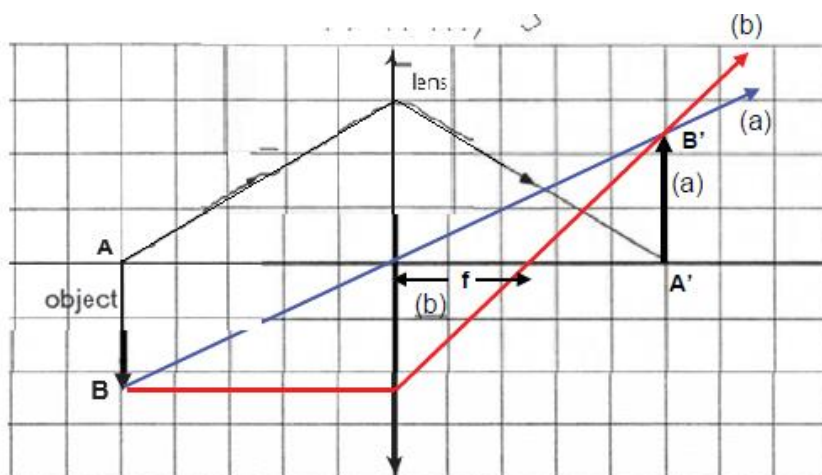
Energy is transferred by conduction. The molecules at the hot end of the metal pipes vibrate faster and collide with neighbouring molecules [1].

Some energy is transferred to the neighbouring molecules as a result of the collisions [1].

At the same time, the free moving electrons also collide with the vibrating molecules [1], thus transferring energy. The process is repeated until energy is transmitted to the cold end.

Question 27

(a), (b)



- (c) The object must be placed less than the focal length from the lens. [1]
- (d) The image is still formed as all the rays from the object can still be refracted through the bottom part of the lens. [1]