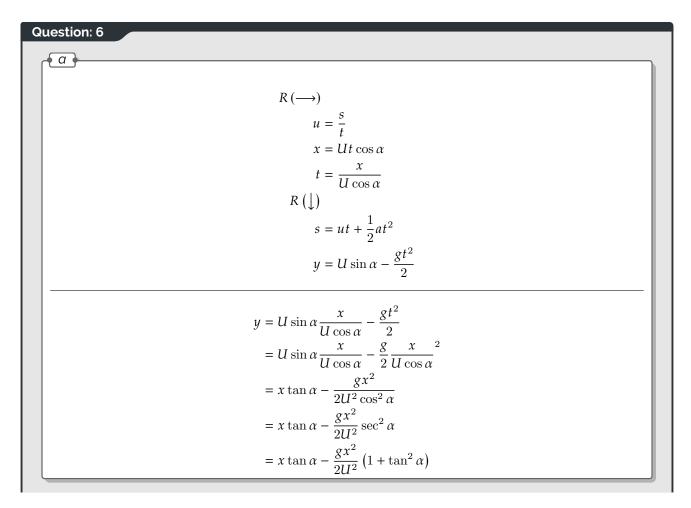
Projectiles

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6D



$$x = Ut \cos \alpha$$

$$= U\frac{v - u}{a} \cos \alpha$$

$$= U\frac{-2U \sin \alpha \cos \alpha}{-9.8}$$

$$= \frac{U^2 \sin 2\alpha}{9.8}$$

$$= \frac{30^2 \sin 90}{9.8}$$

= 91.8m

$$t = \frac{v - u}{a}$$

$$= \frac{-2U \sin \alpha}{-9.8}$$

$$= 4.3s$$

Question: 7

€a

$$y = U \sin \alpha \frac{x}{U \cos \alpha} - \frac{gt^2}{2}$$

$$= U \sin \alpha \frac{x}{U \cos \alpha} - \frac{g}{2} \frac{x}{U \cos \alpha}^2$$

$$= x \tan \alpha - \frac{gx^2}{2U^2 \cos^2 \alpha}$$

$$0.9 = 9 \tan \alpha - \frac{9^2 g}{2U^2 \cos^2 \alpha}$$
$$0.9 = 9 \tan \alpha - \frac{81 g}{2U^2 \cos^2 \alpha}$$

b

$$0.9 = 9 \tan 30 - \frac{81g}{2U^2 \cos^2 30}$$
$$0.9U^2 - 9 \tan 30U^2 = -\frac{81g}{2\cos^2 30}$$
$$U = \sqrt{\frac{-\frac{81s - 9.8}{2\cos^2 30}}{0.9 - 9\tan 30}}$$
$$U = 16.9ms^{-1}$$

Mixed Exercises 6

Question: 6

Need to find half of what the total time would be if it hit the ground again.

$$t = \frac{v - u}{a} \div 2$$
$$= \frac{-U \sin \alpha}{-9.8}$$
$$= \frac{40 \sin 30}{9.8}$$
$$= 2.04s$$

b

$$s = ut - \frac{1}{2}at^{2}$$

$$15.1 = 40t \sin 30 - \frac{1}{2}9.8t^{2}$$

$$t = 3.0816, 1$$

$$t = 3.082s$$

C

$$u = 40\cos 30$$

$$= 20\sqrt{3} = 34.64$$

$$R(\downarrow)$$

$$s = vt - \frac{1}{2}at^{2}$$

$$vt = \frac{1}{2}at^{2} - s$$

$$v = \frac{1}{2}at + \frac{s}{t}$$

$$= \frac{1}{2} * -9.81 * 3.082 + \frac{15.1}{3.082}$$

$$= -10.244 = -10.2$$

$$V = \sqrt{(20\sqrt{3})^{2} + -10.244^{2}}$$

 $R(\longrightarrow)$

 $=36.1ms^{-1}$

Question: 7

a

$$s_y = ut + \frac{1}{2}at^2$$

$$-0.2 = 0t - \frac{1}{2} * 10 * t^2$$

$$0.04 = t^2t$$

$$= 0.2s$$

$$s_x = ut + \frac{1}{2}at^2$$
$$= 0.2 * 10$$
$$= 2m$$

b

$$y = x \tan \alpha - \frac{gx^2}{2U^2} \left(1 + \tan^2 \alpha \right)$$

$$0 = 2 \tan \alpha + \frac{10 * 2^2}{2 * 10^2} \left(1 + \tan^2 \alpha \right)$$

$$0 = \frac{1}{5} \tan^2 \alpha + 2 \tan \alpha + \frac{1}{5}$$

$$\tan \alpha = -5 \pm 2\sqrt{6} = -0.101, -5.898$$

$$\alpha = ???? \text{ Near to } \pi, \text{ so throwing back and up?}$$