KEY

Gravity Practice - Version 2

1.) A cliff diver is on a $30.0\ m$ high cliff. With what velocity should they leave the cliff, (assume the person jumps out horizontally) in order to miss $8.0\ m$ of rock coming from the cliff's base?

Solve for time first. Solve for displacement second. $\vec{v}_x = +3.2\ \frac{m}{s}$

2.) A mountain goat butts you off a $50.0\ m$ high cliff with a horizontal velocity of $+3.0\frac{m}{s}$. How far from the base will you strike the ground?

Solve for time first. Solve for displacement second. $\vec{d}_x = +9.6\ m$

3.) A golfer strikes a ball giving it a velocity of $+35\frac{m}{s}$ at 35^o. If the course is completely flat how far will the ball travel before bouncing?

Solve for time first. Solve for displacement second. $\vec{d}_x = +1.2\ \times 10^2\ m$

4.) Use the information in #3 to find the maximum height to which the ball will rise.

Solve using $\vec{d}_y = \vec{v}_{oy}t + \frac{1}{2}\vec{a}t^2$ but with only half time as this is the highest point. $\vec{d}_y = +21\ m$

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5.) A cat leaps off a building (the crowd goes wild with applause) of height $30.0\ m$. If it left the building with a horizontal velocity of $+1.0\frac{m}{s}$ will it land safely on some garbage bags $5.0\ m$ from the base of the building?

Solve for time first and use that to solve for the distance the cat travels.

No the cat doesn't make it as $\vec{d}_x = +2.47\ m$

6.) What will be the vertical velocity of the cat above at the exact moment of impact?

Solve for velocity using $\vec{v}_{fy}{}^2 = \vec{v}_{oy}{}^2 + 2ad$ $\vec{v}_{fy} = -24.2\frac{m}{s}$

7.) A baseball is hit at $30.0\frac{m}{s}$ on an angle of 40^o, what is its maximum height?

Solve for the time in the air. Use half the time as we only want flight time to the top and use

$\vec{d}_y = \vec{v}_{oy}t + \frac{1}{2}\vec{a}t^2$ $\vec{d}_y = +19.0\ m$

8.) A stunt person jumps at $5.0\frac{m}{s}$ horizontally, if she just lands on an airbag $24.2\ m$ from the base of a building how high was the building?

Solve for time using horizontal formula. $\vec{d}_y = 115\ m$

Bonus - A kid throws a rock on a $45^o\ angle$ with velocity $+10.0\frac{m}{s}$ off a $10.0\ m$ high cliff. How far from the base of the cliff will the rock land? Solve using the quadratic equation.

Answer – Solve for time. $\vec{d}_y = \vec{v}_{o_y}t + \frac{1}{2}\vec{a}t^2$ $-10 = (+7.07)t + (0.5)(-9.81)t^2$

Use quadratic equation. $t = \frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $t = \frac{-7.07\pm\sqrt{7.07^2-4(-4.905)(+10)}}{2(-4.905)}$ $t = 2.32\ s$

$\vec{v}_x = \frac{\Delta\vec{d}_x}{\Delta t}$ $7.07 = \frac{\Delta\vec{d}_x}{2.32}$ $\vec{d}_x = 16.4024\ m$ $\vec{d}_x = 16.4\ m$