

# Linear Motion




**JEOPARDY!**

# Graphic Questions



**The Need For Speed!**

# Linear Motion



**Free-Fall**



**Physics is Phun!**

Graphic Questions

The Need For Speed!

Linear Motion

Free Fall

Physics is Phun!

5 pt.

5 pt.

5 pt.

5 pt.

5 pt.

10 pt.

10 pt.

10 pt.

10 pt.

10 pt.

15 pt.

15 pt.

15 pt.

15 pt.

15 pt.

20 pt.

20 pt.

20 pt.

20 pt.

20 pt.

25 pt.

25 pt.

25 pt.

25 pt.

25 pt.

**Sketch a displacement  
vs. time graph.**

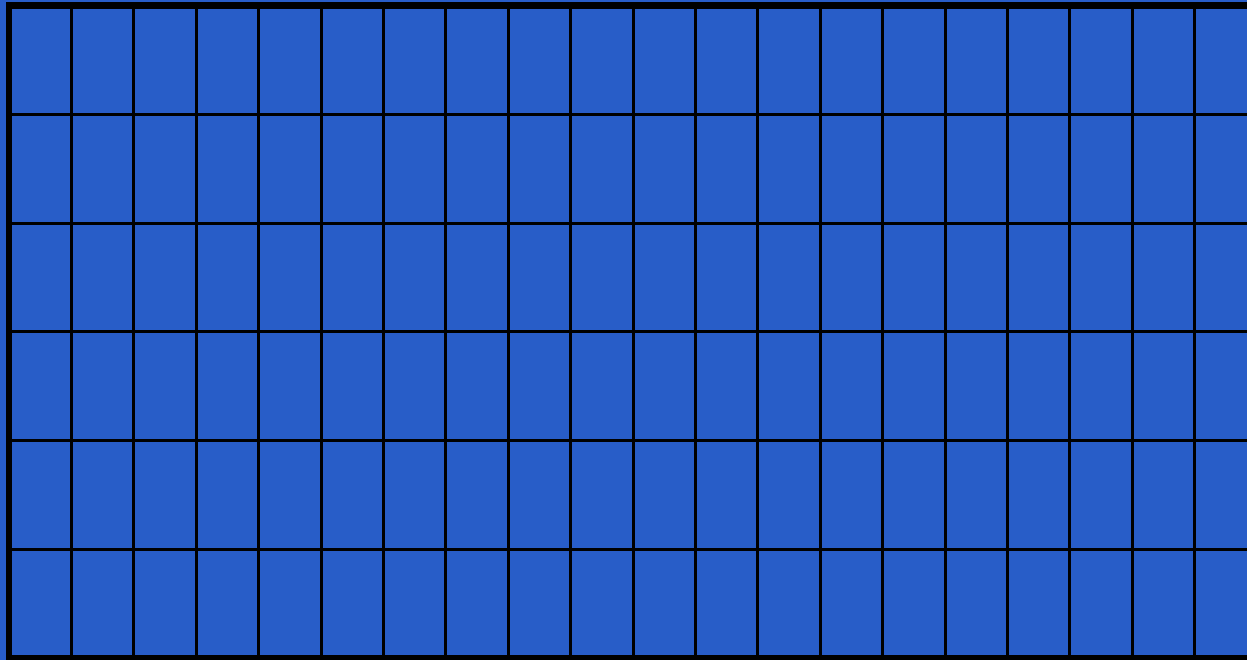
**5 pt.**





# Displacement vs Time

Displacement (m)



Time (s)

5 pt.



**If you create a displacement  
vs. time graph, what can  
you calculate from the slope  
of the line?**

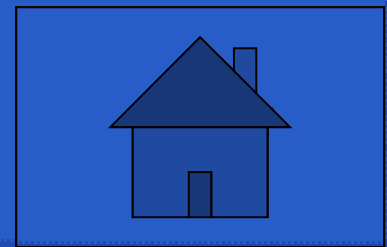
**10 pt.**



**If you create a displacement  
vs. time graph, what can  
you calculate from the slope  
of the line?**

**The velocity**

**10 pt.**



**If you take the slope of a  
velocity time graph, what  
value do you have?**

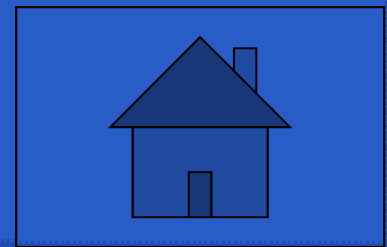
**15 pt.**



**If you take the slope of a  
velocity time graph, what  
value do you have?**

**The Acceleration**

15 pt.



**If you take a displacement vs time graph, and calculate the area under the graph, what does this value mean?  
(hint:  $d \cdot t$ )**

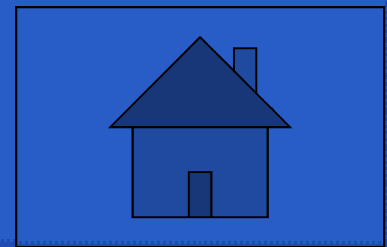
**20 pt.**



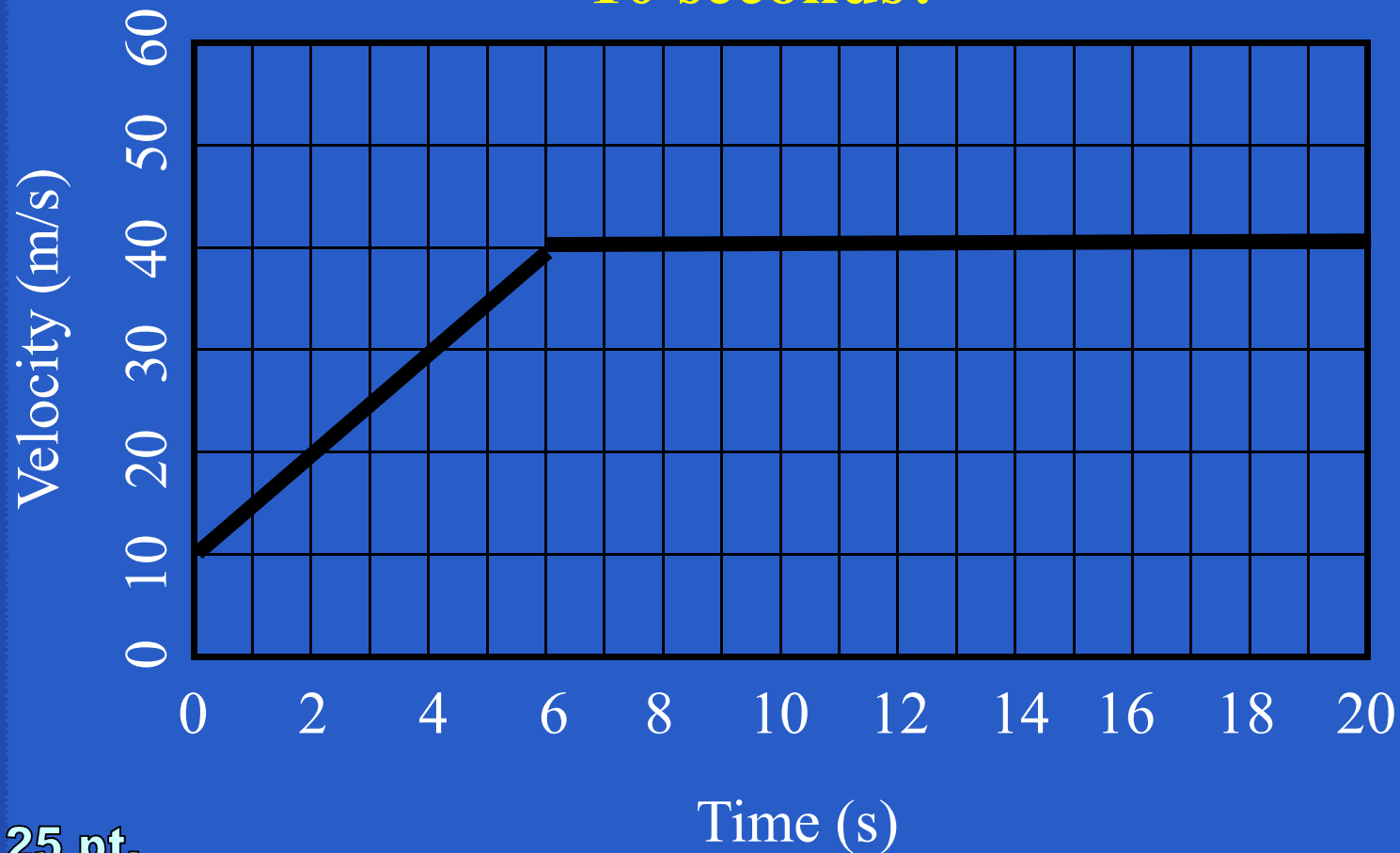
**If you take a displacement vs time graph, and calculate the area under the graph, what does this value mean?  
(hint:  $d \cdot t$ )**

**It means nothing.  
(hey, for this many points, you get a  
trick question!)**

**20 pt.**



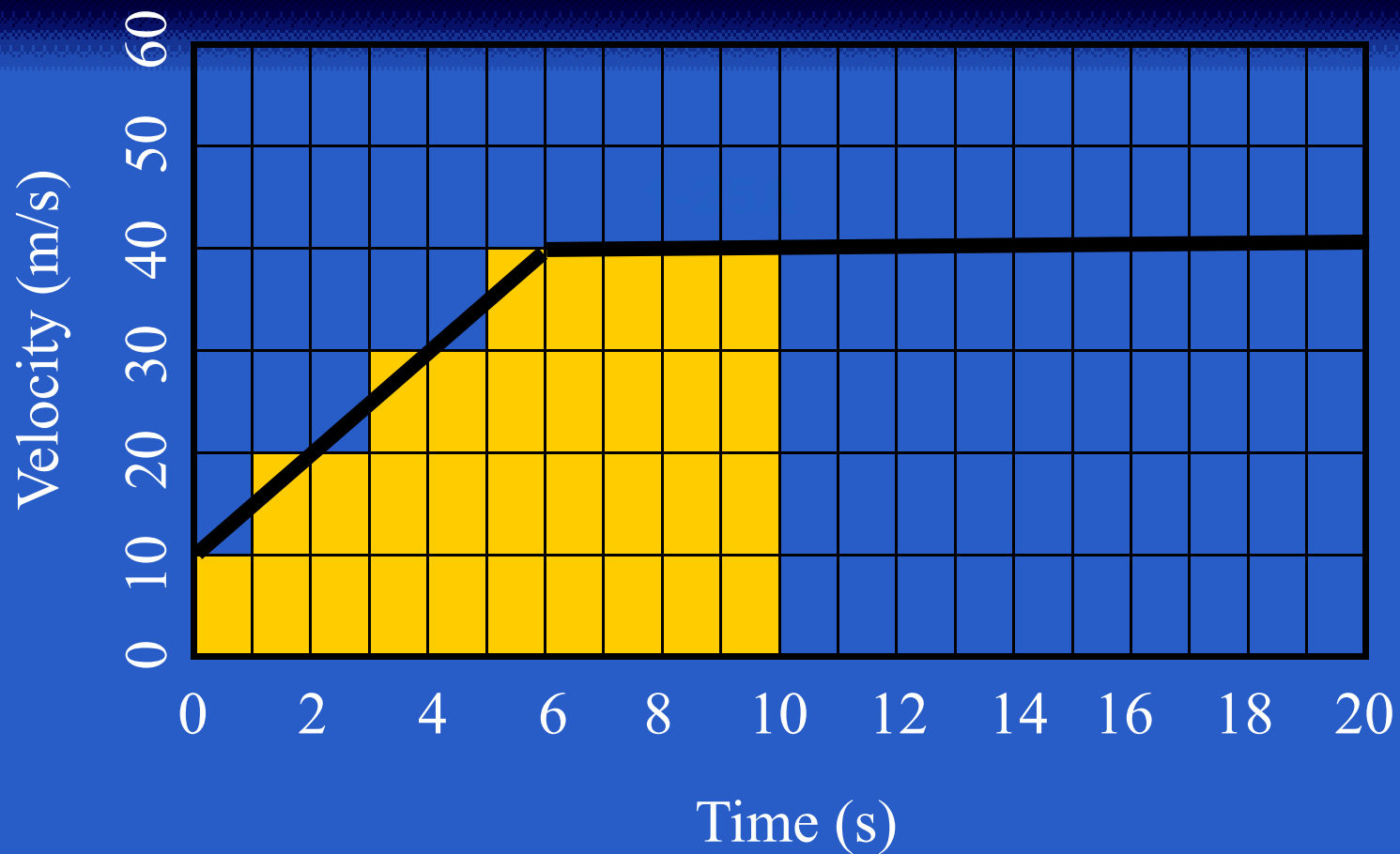
The graph below is a velocity vs time graph. What is the displacement after 10 seconds?



25 pt.

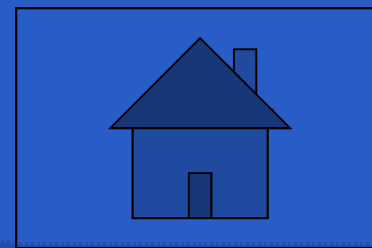






Calculate the area under the graph for the first 10 seconds.

**25 pt.** Area =  $310 \text{ m/s} \cdot \text{s}$  or **310 m**



**How fast is 50 kmph in meters  
per second?**

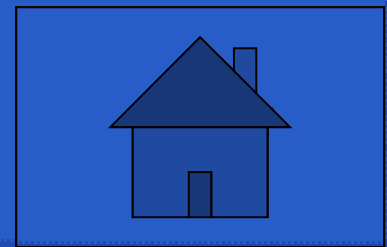
**5 pt.**



**How fast is 50 kmph in meters  
per second?**

$$(50 \text{ km/hr}) (1000\text{m/km}) (\text{hr}/3600 \text{ sec})$$
$$= 13.9 \text{ m/sec}$$

**5 pt.**



**A ball on a string travels in a circular path at a constant speed. Is it undergoing an acceleration?**

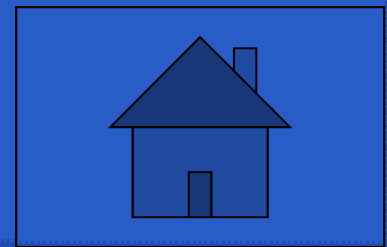
**10 pt.**

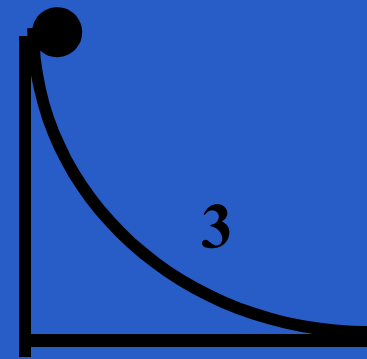
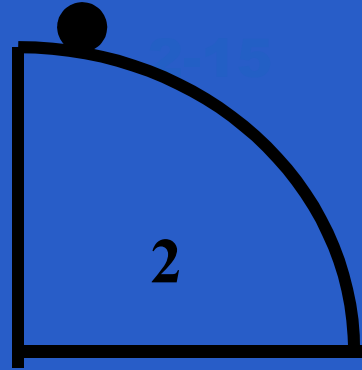
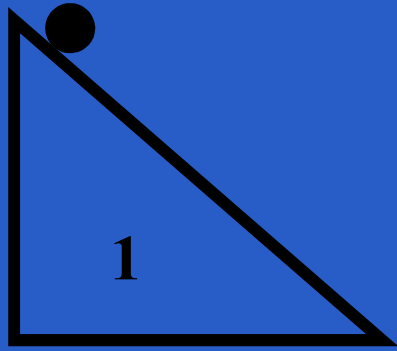


**A ball on a string travels in a circular path at a constant speed. Is it undergoing an acceleration?**

**Yes, because its velocity is changing since it is moving in a different direction all the time.**

10 pt.

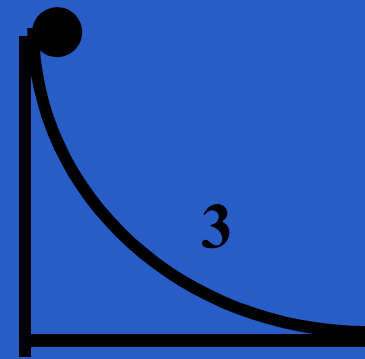
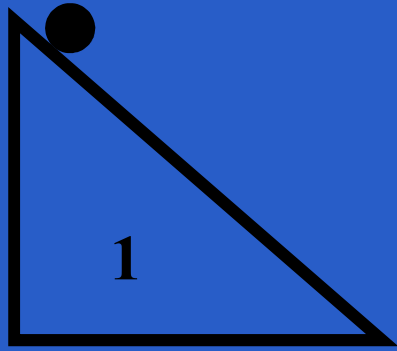




Which ramp would give the ball both an increasing speed and increasing acceleration?

15 pt.

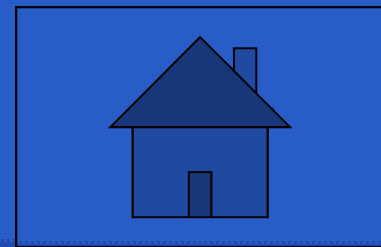




Which ramp would give the ball both an increasing speed and increasing acceleration?

Ramp #2

15 pt.



**What is the acceleration of a car  
that goes from 0 to 100 m/sec in 2  
minutes? (*answer in m/sec<sup>2</sup>*)**

**20 pt.**





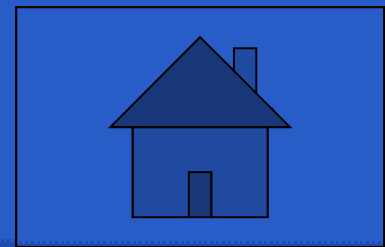
**What is the acceleration of a car  
that goes from 0 to 100 m/sec in 2  
minutes? (*answer in m/sec<sup>2</sup>*)**

$$a = \Delta v / t \quad \text{and,}$$
$$t = 2 \text{ min (60sec/min)} = 120 \text{ sec}$$

$$\text{SO... } a = (100\text{m/s} - 0\text{m/s})/120 \text{ sec}$$

$$a = 0.833 \text{ m/sec}^2$$

20 pt.



**An object travels 2 meters in its first second of motion, 2 meters in the next second of motion, and 2 meters in the third second of motion. What is its acceleration in  $\text{m/sec}^2$ ?**

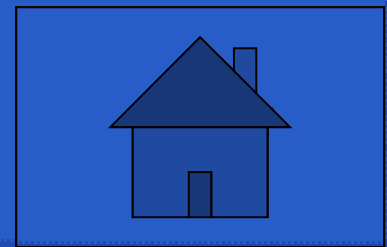
**25 pt.**



**An object travels 2 meters in its first second of motion, 2 meters in the next second of motion, and 2 meters in the third second of motion. What is its acceleration in  $\text{m/sec}^2$ ?**

**$a = 0 \text{ m/sec}^2$  because it travels the same velocity (2 m/sec) every second!**

**25 pt.**



**A dragster accelerates down the track at a constant rate. It starts from rest and crosses the finish line moving at a speed of 250 mph. What is its average velocity?**

**5 pt.**



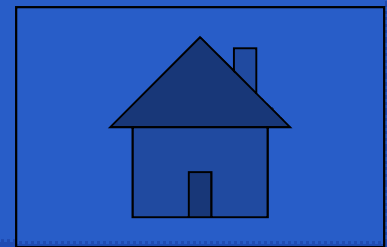
**A dragster accelerates down the track at a constant rate. It starts from rest and crosses the finish line moving at a speed of 250 mph. What is its average velocity?**

$$v_{\text{avg}} = (v_f + v_i)/2$$

$$v_{\text{avg}} = (250\text{mph} + 0\text{mph})/2$$

$$v_{\text{avg}} = 125 \text{ mph}$$

**5 pt.**



**How fast are you moving if  
you accelerate from rest at 3  
 $\text{m/sec}^2$  for one minute?**

**10 pt.**



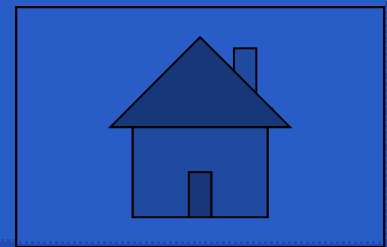
**How fast are you moving if  
you accelerate from rest at 3  
m/sec<sup>2</sup> for one minute?**

$$a = \Delta v / t \quad \text{and,}$$
$$t = 1 \text{ min (60 sec/min)} = 60 \text{ sec}$$

$$\text{so... } 3 \text{ m/sec}^2 = \Delta v / 60 \text{ sec}$$
$$\Delta v = (3 \text{ m/sec}^2)(60 \text{ sec})$$

$$v = 180 \text{ m/sec}$$

10 pt.



**How far would you travel if  
you accelerated at  $4.5 \text{ m/sec}^2$   
for 12 seconds?**

**15 pt.**





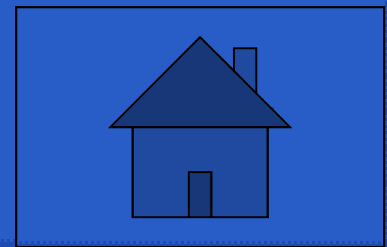
**How far would you travel if  
you accelerated at 4.5 m/sec<sup>2</sup>  
for 12 seconds?**

$$d = \frac{1}{2}at^2$$

$$d = \frac{1}{2}(4.5\text{m/sec}^2)(12\text{sec})^2$$

$$d = 324 \text{ meters}$$

15 pt.



**How much time would it take to  
run 100 meters if you accelerate  
from rest by  $2 \text{ m/sec}^2$ ?**

**20 pt.**



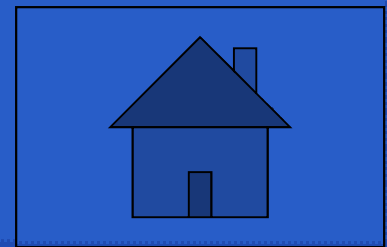
**How much time would it take to  
run 100 meters if you accelerate  
from rest by 2 m/sec<sup>2</sup>?**

$$d = \frac{1}{2}at^2 \quad \text{and}$$

$$t = \sqrt{(2d / a)} = \sqrt{[2(100\text{m})/(2\text{m/sec}^2)]}$$

$$t = 10 \text{ seconds}$$

20 pt.



**How far would a sprinter run if they start at rest and end the race moving at a velocity of 20 m/sec? Assume they run for 10 seconds.**

**25 pt.**



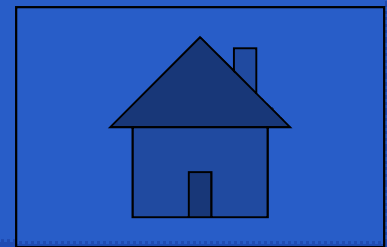
**How far would a sprinter run if they start at rest and end the race moving at a velocity of 20 m/sec? Assume they run for 10 seconds.**

$$v_{\text{avg}} = (20\text{m/sec} + 0\text{m/sec})/2 = 10 \text{ m/sec}$$

$$d = v_{\text{avg}}t = (10\text{m/sec})(10\text{sec})$$

$$d = 100 \text{ meters}$$

25 pt.



**What is the value of  $g$ , the  
acceleration due to gravity on  
the Earth's surface?**

**5 pt.**

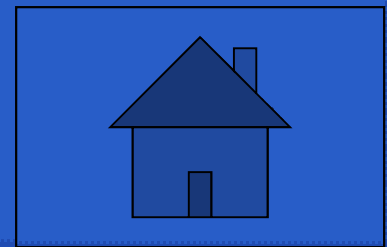


**What is the value of g, the  
acceleration due to gravity on  
the Earth's surface?**

$$g = 9.8 \text{ m/sec}^2 = 32 \text{ ft/sec}^2$$

**or approximately 10 m/sec<sup>2</sup>**

**5 pt.**



**Two objects, a small feather and an anvil, are dropped on the surface of the Moon from the same height.  
Which hits the ground first?**

- A) the anvil hits the ground first**
- B) the feather hits the ground first**
- C) they both hit at the same time**
- D) not enough info**

**10 pt.**

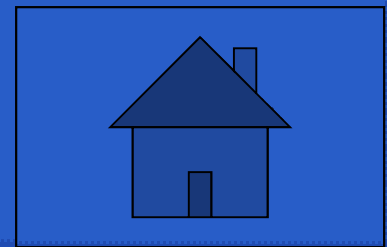




**Two objects, a small feather and an anvil, are dropped on the surface of the Moon from the same height.  
Which hits the ground first?**

**C) they both hit at the same time**

**10 pt.**



**A baseball is thrown straight upwards  
at a velocity of 60 m/sec. How long  
until it reaches the top of its path?  
What is the acceleration of the  
baseball at the top?**

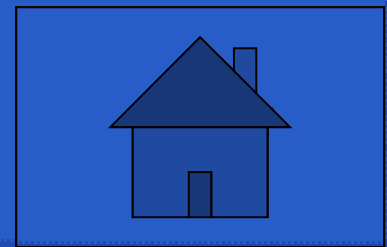
**15 pt.**



**A baseball is thrown straight upwards  
at a velocity of 60 m/sec. How long  
until it reaches the top of its path?  
What is the acceleration of the  
baseball at the top?**

**$t = 6$  seconds  
and  $a = 10 \text{ m/sec}^2$  downwards**

**15 pt.**



**Your Team may wager from 0-50 pts.**

# **DAILY DOUBLE**

**You must make your wager BEFORE  
the Daily Double is revealed!!!**

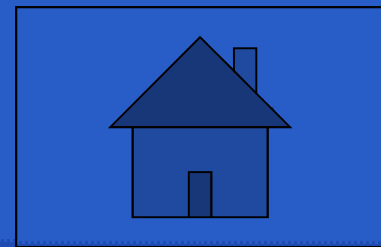
Daily Double

Daily Double

**A ball is launched upwards at 80 m/sec. What is the velocity (speed & direction) of the ball 10 seconds later?**

**20 m/sec downwards**

Daily Double



**If there were no air resistance, how fast would raindrops released from clouds 3 km high be traveling when they hit the ground?**

**25 pt.**



**If there were no air resistance, how fast would raindrops released from clouds 3 km high be traveling when they hit the ground?**

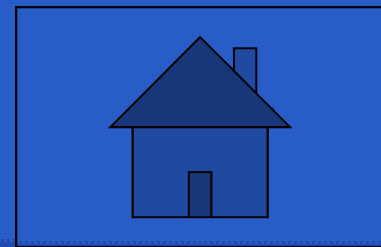
$$d = 3 \text{ km} (1000\text{m/km}) = 3000 \text{ m}$$

$$d = \frac{1}{2}gt^2 \quad \text{so...} \quad t = \sqrt{(2d / g)}$$

$$t = \sqrt{[2(3000\text{m})/(10\text{m/sec}^2)]} = 24.5 \text{ sec}$$

$$v = gt = (10\text{m/sec}^2)(24.5\text{sec}) = 245 \text{ m/sec}$$

25 pt.



**Who wrote Newton's  
First Law of Inertia?**

**5 pt.**





# Isaac Newton



Give the man the respect he deserves!!!

5 pt.



5-10

**Name the character and movie  
that produced this famous quote:**

**“Do, or do not, there is no ‘try’.”**

**10 pt.**



# Jedi Master Yoda, in *The Empire Strikes Back*



10 pt.

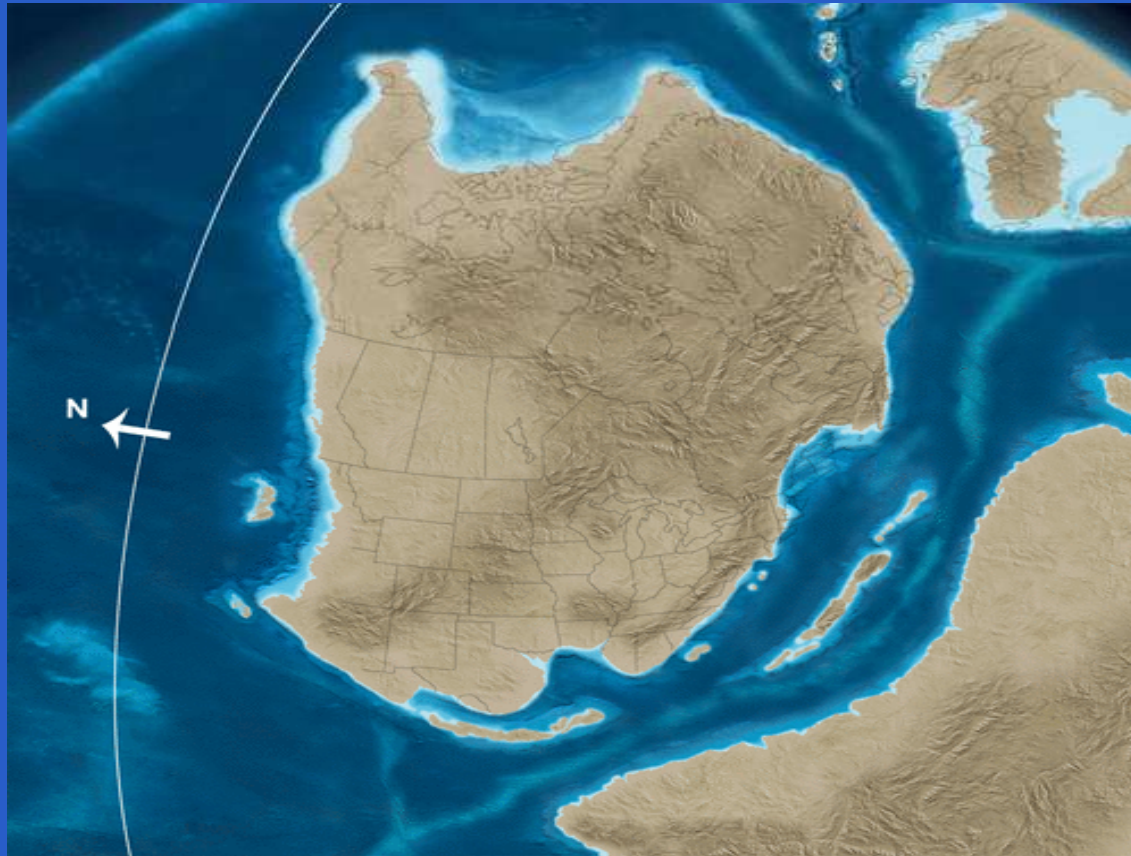


**According to science, what is the  
approximate age of the Earth?**

**15 pt.**



# 4.5-4.6 billion years



15 pt.

This is only  
shows about  
200 million  
years back!



**Which month contains 28  
days, as well as 29 days every  
four years?**

**20 pt.**



5-20A

# They all do!

## Trick Question – nyah, nyah!!!

20 pt.



**What is the average  
airspeed velocity of an  
unladen swallow?**

**25 pt.**

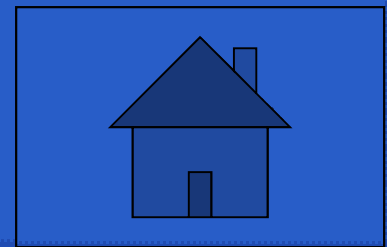




# An African or a European swallow?

Click me to “Answer me, these questions 3!!!)”

25 pt.



Daily Double



Daily Double

**A ball is launched upwards at 80 m/sec. What is the velocity (speed & direction) of the ball 10 seconds later?**

Daily Double



Daily Double