Math and Measurement
Honors physics

Name Key 5'20

I. Indicate the number of significant figures and then write the number using correct scientific notati

	Number of significant figures	Written in scientific notation
a. 0.0000781 m	3	
b. 93,450,000 g	4	
c. 314.0 mi/h	4	
d. 5 m/s	1	
e. 27.005 cm	5	
f. 0.0043 kg	2	
g. 0.32 N	2	
h. 4,000.0 C	5	
i. 670 V	2	

II. Take the following numbers out of scientific notation.

a. 3.02×10^{4}	30200
b. 5.2×10^{-2}	0.052
c. 1.999×10^{-1}	0.1999
d. 4.320×10^{5}	432000
e. 2.0×10^{0}	2.0

III. Perform the following operations, and make sure the final answer contains the correct number of significant figures.

a. (0.000010 m)(0.00055 m)(0.002 m) =	1×10^{-11} m^3
b. (240 cm)(30 cm)(5000 cm) =	4×10^{7} cm^3
c. $\frac{8{,}000{,}000 \text{ m}}{400 \text{ s}}$ =	2×10^{4} m/s
d. $\frac{72{,}000{,}000 \text{ mi}}{0.00024 \text{ h}}$ =	3.0×10^{11} mi/h
e. $\frac{3.5 \times 10^{-3} \text{ J}}{5 \times 10^{-5} \text{ C}}$ =	70 $\frac{J}{C}$
f. 135.12 kg + 0.267 kg + 5.2 kg =	140.6 kg
g. 198.057 kg – 0.12 kg =	197.94 kg
h. (20.0 cm)(10 cm)(5.00 cm) =	1,000 cm^3
i. $(3.0 \times 10^{4} \text{ s})(4.0 \times 10^{2} \text{ m/s})$ =	1.2×10^{7} m
j. 128.05 N + 0.5 N =	128.6 N

IV. Convert the following measurements.

a. 1.5 m to cm	150 cm
b. 75 cm to m	0.75 m
c. 125.6 g to kg	0.1256 kg
d. 19.2 kg to g	19,200 g
e. 40 km to m	40,000 m
f. 1620 m to km	1.62 km
g. 7.6 cm to mm	76 mm
h. 64.3 mm to cm	6.43 cm
i. 3.78×10^{-6} m to nm	3780 nm
j. 508 nm to m	5.08×10^{-7} m

V. Convert the following measurements to the indicated units.

a. 300 Cal to Joules

$$300 \text{ Cal} \times \frac{4184 \text{ J}}{1 \text{ Cal}} = 1{,}255{,}200 \text{ J} = 1 \times 10^{6} \text{ J}$$

b. 200 slugs to kg

$$200 \text{ slugs} \times \frac{14.6 \text{ kg}}{1 \text{ slug}} = 2{,}920 \text{ kg} = 3{,}000 \text{ kg}$$

c. 10 km to miles

$$10 \text{ km} \times \frac{1 \text{ mi}}{1.61 \text{ km}} = 6.21 \text{ mi} = 6 \text{ mi}$$

d. 3×10^{8} m/s to mi/h

$$3 \times 10^{8} \frac{\text{m}}{\text{s}} \times \frac{3600 \text{ s}}{1 \text{ h}} \times \frac{3.28 \text{ ft}}{1 \text{ m}} \times \frac{1 \text{ mi}}{5280 \text{ ft}} = 6.709 \times 10^{8} \frac{\text{mi}}{\text{h}}$$

$$= 7 \times 10^{8} \frac{\text{mi}}{\text{h}}$$

e. 93,000,000 miles to meters

$$9.3 \times 10^{7} \text{ mi} \times \frac{1.61 \text{ km}}{1000 \text{ mi}} \times \frac{1000 \text{ m}}{1.61 \text{ km}} = 1.4973 \times 10^{11} \text{ m}$$

$$= 1.5 \times 10^{11} \text{ m}$$

f. 55 mi/hr to m/s

$$\frac{55 \text{ mi}}{\text{h}} \times \frac{1 \text{ h}}{3600 \text{ s}} \times \frac{1610 \text{ m}}{1 \text{ mi}} = 24.5972 \frac{\text{m}}{\text{s}} = 25 \frac{\text{m}}{\text{s}}$$

VI. Rearrange the following equations so that y is isolated on the left side of the equal sign.

$x = \frac{y}{z}$ $\quad y = x \cdot z$

$x = \frac{z}{y}$ $\quad \frac{x \cdot y}{x} = \frac{z}{x}$ $\quad y = \frac{z}{x}$

$x = y \cdot z$ $\quad \frac{x}{z} = \frac{y \cdot z}{z}$ $\quad y = \frac{x}{z}$

$x = \frac{y - z}{t}$ $\quad y - z + z = x \cdot t + z$ $\quad y = x \cdot t + z$

$x = \frac{1}{2} \cdot y \cdot z^2$ $\quad 2 \cdot \frac{x}{z^2} = \frac{1}{2} y \cdot 2$ $\quad y = \frac{2x}{z^2}$

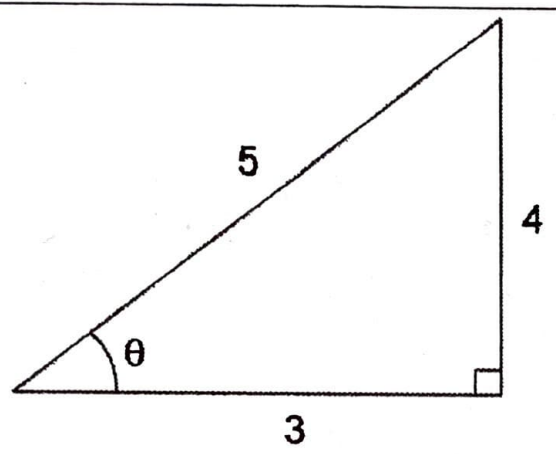
$x = \frac{1}{2} \cdot z \cdot y^2$ $\quad 2 \cdot \frac{x}{z} = \frac{1}{z} y^2 \cdot z$ $\quad \sqrt{\frac{2x}{z}} = \sqrt{y^2}$ $\quad y = \sqrt{\frac{2x}{z}}$

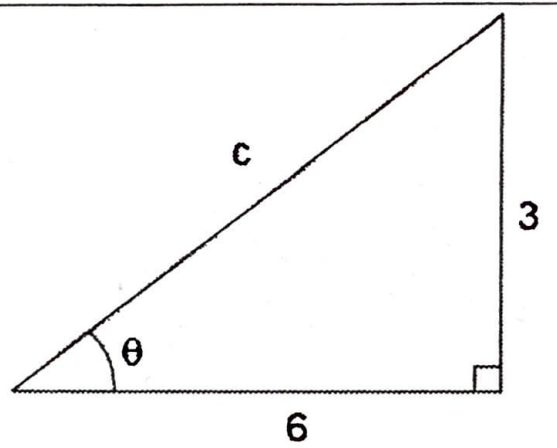
$z^2 = x + 2 \cdot b \cdot y$ $\quad -x \; -x$ $\quad \frac{z^2 - x}{2b} = \frac{2by}{2b}$ $\quad y = \frac{z^2 - x}{2b}$

$x = \frac{2\sqrt{y}}{z}$ $\quad \frac{x \cdot z}{2} = \frac{2\sqrt{y}}{2}$ $\quad (\sqrt{y})^2 = \left(\frac{x \cdot z}{2}\right)^2$

$y = \left(\frac{x \cdot z}{2}\right)^2$

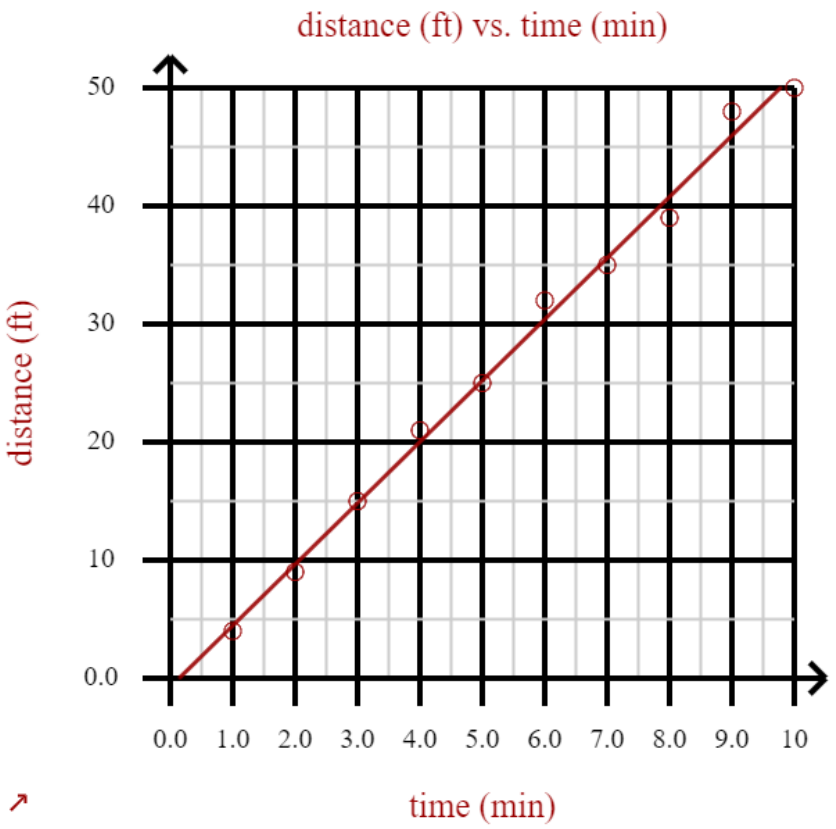
Use Degree mode in Physics



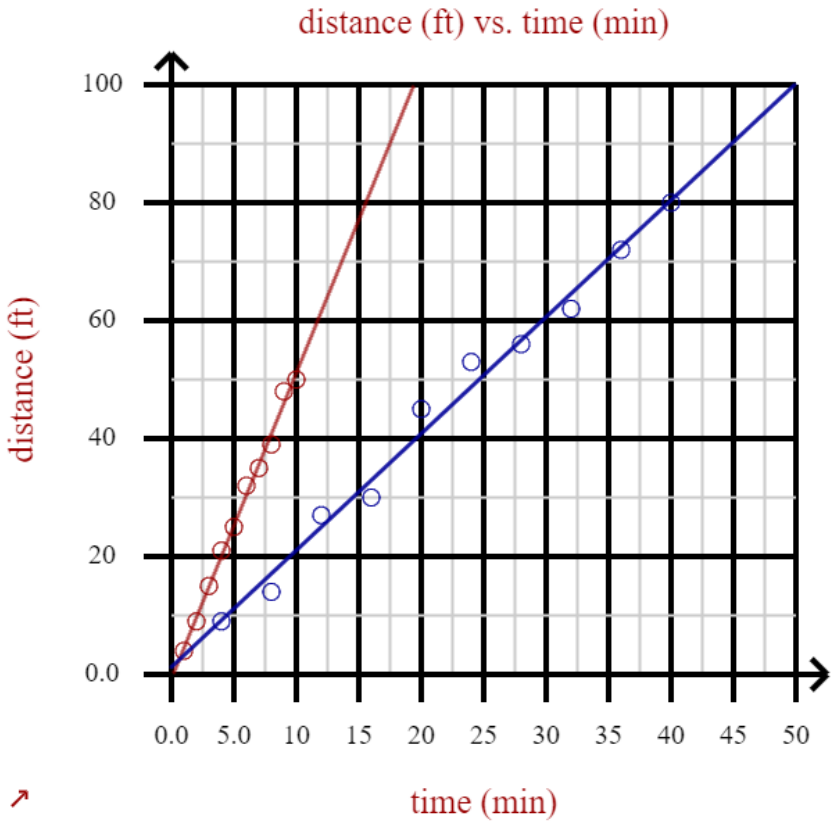


Cosine θ	0.6	$\cos\theta = \frac{adj}{hyp}$	Tangent θ	0.5	$\tan\theta = \frac{3}{6}$
Sine θ	0.8	$\sin\theta = \frac{opp}{hyp}$	Side c	6.71	$a^2 + b^2 = c^2$
Tangent θ	1.33	$\tan\theta = \frac{opp}{adj}$	θ	26.57°	$\theta = \tan^{-1}\left(\frac{3}{6}\right)$

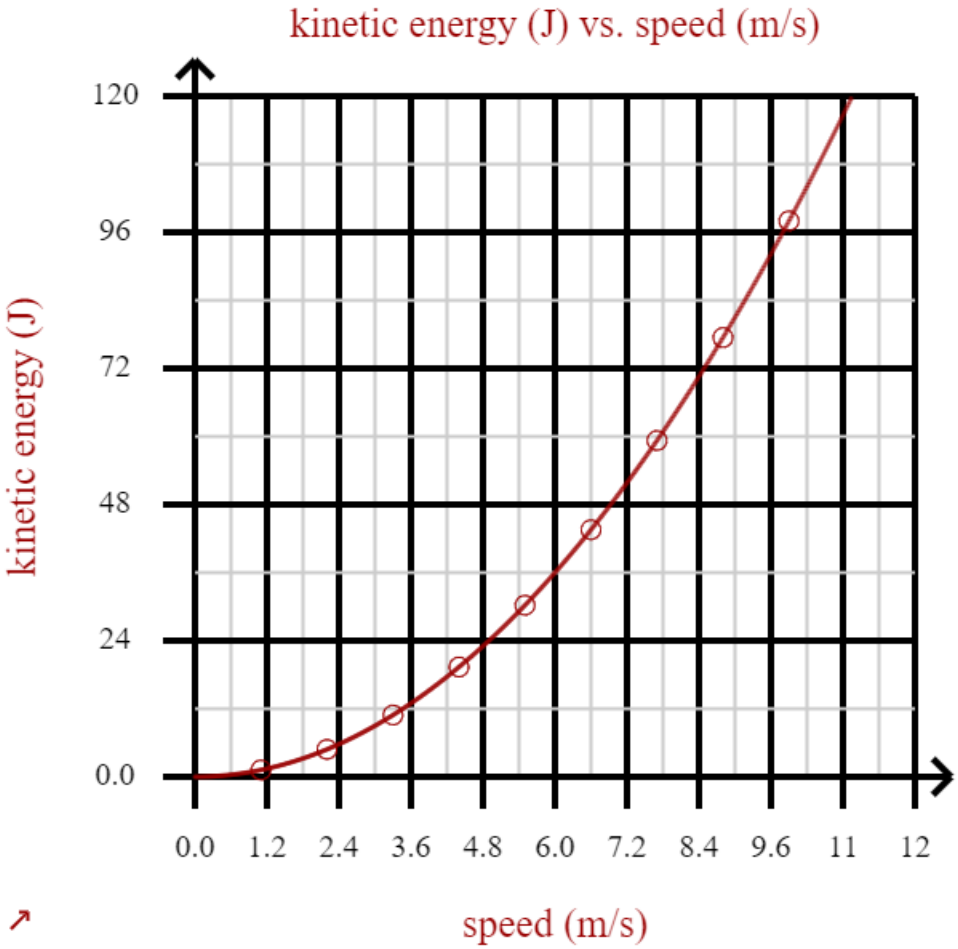
Part VII(a)



Part VII(b)



Part VII(c)


kinetic energy (J) vs. speed (m/s)
kinetic energy (J)
120
96
72
48
24
0.0
0.0
1.2
2.4
3.6
4.8
6.0
7.2
8.4
9.6
11
12
speed (m/s)