

Physics Yr12 Summer Home learning

Physics is a subject which is based in mathematics. As such, a strong grasp of mathematical techniques and skills is essential in becoming a good physicist and scoring well in your exams.

The following tasks are designed to help you practice these key techniques, and to identify if you need to research and practice more. Each task will comprise of two components. The first component will include the answers to make sure that you are confident the techniques you are using are effective. The second component will not include answers and will need to be handed in to your teacher in your first lesson of the year.

1. **Rearranging algebra**
2. **Trigonometry**

Your task is to make sure that when you arrive in September that the following mathematical skills are as fluent to you as addition and subtraction.

We will be using these skills immediately, and the first topic (mechanics) will heavily feature them

Note: For task 2 you will need to research what the “radian” unit is and become familiar with using this as a measure of angle instead of degrees. This will require substantial research and practice with using them before you attempt the conversions and questions in this worksheet. If you are “not sure” what a radian is and how its defined, then you have not learnt it and researched it appropriately.

Section 1.1: Re-arranging algebra

Rearrange the following expressions to make the letter in brackets the subject.

1) $V = IR$ (I)

ans: $I = \frac{V}{R}$

2) $V = \pi r^3 h$ (h)

ans: $h = \frac{V}{\pi r^3}$

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3) $v = u + at$ (u)

ans: $u = v - at$

4) $P = 2(L + W)$ (W)

ans: $W = \frac{P}{2} - L$

5) $A = \frac{h(a+b)}{2}$ (h)

ans: $h = \frac{2A}{a+b}$

6) $I = mv - mu$ (m)

ans: $m = \frac{I}{v-u}$

7) $A = 2\pi r^2 + 2\pi r h$ (h)

ans: $h = \frac{A}{2\pi r} - r$

8) $F = \frac{L}{4\pi d^2}$ (d)

ans: $d = \sqrt{\frac{L}{4\pi F}}$

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9) $c = \sqrt{\frac{T}{\mu}}$ (T)

ans: $T = c^2\mu$

10) $A = \pi(R^3 - r^3)$ (r)

ans: $r = \sqrt[3]{R - \frac{A}{\pi}}$

11) $E^2 = p^2c^2 + m^2c^4$ (p)

ans: $p = \sqrt{\frac{E^2 - m^2c^4}{c^2}}$

Section 2.1: Trigonometry

1) Convert the following degree measurements into radians

a. 45°

ans: $\frac{\pi}{4}$

b. 76°

ans: $\frac{19\pi}{45}$

c. 150°

ans: $\frac{5\pi}{6}$

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d. 40°

ans: $\frac{2\pi}{9}$

e. 50°

ans: $\frac{5\pi}{18}$

f. -30°

ans: $-\frac{\pi}{6}$

2) Convert the following radian measures into degrees

a. $\frac{7\pi}{3}$

ans: 420°

b. $\frac{\pi}{6}$

ans: 30°

c. π

ans: 180°

d. $\frac{7\pi}{4}$

ans: 315°

e. $\frac{2\pi}{3}$

ans: 120°

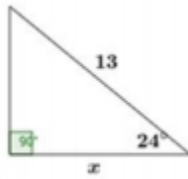
f. $-\frac{\pi}{4}$

ans: -45°

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3) Use the appropriate trig function to find the missing length or angle. Give your answer to 2dp.

a.



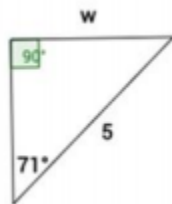
ans: 11.88

b.



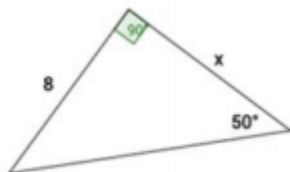
ans: 7.64

c.



ans: 4.73

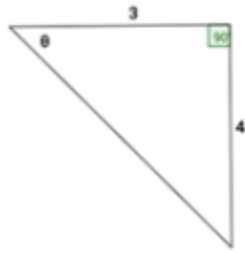
d.



ans: 6.71

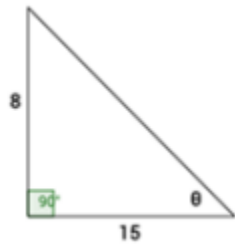
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e.



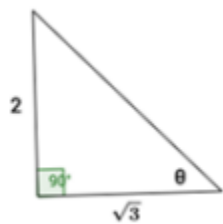
ans: 53.13°

f.



ans: 28.07°

g.



ans: 49.11°

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Section 1.2: Re-arranging algebra

Rearrange the following expressions to make the letter in brackets the subject.

1) $y = mx + c$ (m)

2) $V = \pi r^3 h$ (r)

3) $I = \frac{PRT}{100}$ (P)

4) $L = l(1 + \alpha t)$ (l)

5) $A = \frac{h(a+b)}{2}$ (a)

6) $I = mv - mu$ (u)

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7) $s = ut + \frac{1}{2}at^2$ (a)

8) $E = \frac{1}{2}mv^2$ (v)

9) $F = \frac{9}{5}C + 32$ (C)

10) $T = 2\pi\sqrt{\frac{l}{g}}$ (l)

11) $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$ (R)

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Section 2.2: Trigonometry

1) Convert the following degree measurements into radians

a. -240°

b. 0°

c. 120°

d. 10°

e. 300°

f. -24°

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2) Convert the following radian measures into degrees

a. $\frac{3\pi}{4}$

b. $-\frac{13\pi}{4}$

c. 2π

d. $\frac{\pi}{3}$

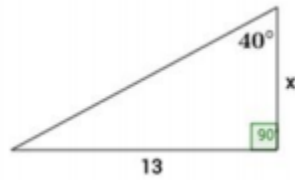
e. $\frac{5\pi}{4}$

f. 3π

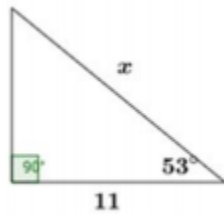
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3) Use the appropriate trig function to find the missing length or angle. Give your answer to 2dp.

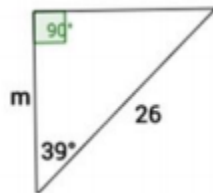
a.



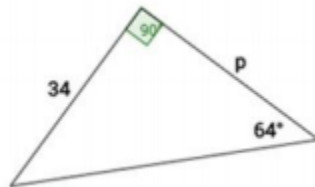
b.



c.



d.

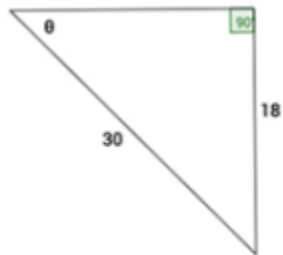


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e.



f.



g.

