PHYS141 OUTLINE QUESTIONS SOLUTIONS

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Exercise 3

Chapter 1, Page 8

Principles of Physics, International Edition

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Solution Verified Answered 2 years ago

Step 1 1 of 2

To solve this problem we will convert miles to meters and hours to seconds. One mile equals 1609.34 meters and one hour has 3600 seconds so we can write now

$$\frac{1\text{m}}{1h} = \frac{1609.34}{3600} = 0447 \approx 0.45\text{m/s}$$

Result 2 of 2

After we round it up, the result is 1mph= 0.45m/s.

Exercise 2

Rate this solution

Exercise 4

Exercise 7

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Step 1 1 of 2

To solve this problem, we need to find the number of hours in one year. Then, we will multiply that number by the speed and finally we will get the maximum number of miles.

$$\mathrm{MAX_{mi}} = 365\mathrm{days} \times 24\mathrm{h} \times 70\mathrm{mph} = 613200\mathrm{mi}$$

Or after taking into account only three significant digits

$$\mathrm{MAX_{mi}} = 6.13 \times 10^5\mathrm{mi}$$

Result 2 of 2

$$\mathrm{MAX_{mi}} = 6.13 \times 10^5\mathrm{mi}$$

Exercise 6

Rate this solution

Exercise 8

Exercise 9

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Step 1 1 of 2

To solve this problem we have to find the total volume of the box containing the one mole of the cubical objects.

$$V_{box} = V_{cube} \times 6.02 \times 10^{23} = 1 \times 10^{-6} \times 10^{23} = 6.022 \times 10^{17}\mathrm{m}^3$$

Now, the length of a box of this volume is given as

$$L = V^{1/3}$$

$$L = (6.02 \times 10^{17}) = 844368.77\mathrm{m} = 8.44 \times 10^{5}\mathrm{m}$$

Result 2 of 2

$$L = 8.44 \times 10^{5}\mathrm{m}$$

Exercise 8 Rate this solution Exercise 10

Exercise 12

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Step 1 1 of 2

To solve this problem we have to determine what fraction of the age of the universe is the age of mankind. Then we will multiply that by the number of seconds in one day.

$$f = \frac{10^6}{10^{10}} = 10^{-4}$$

$$n_s = 24 \times 3600 = 86400\text{s}$$

$$f \times n_s = 10^{-4} \times 86400 = 8.64\text{s}$$

Result 2 of 2

$$8.64\text{s}$$

Exercise 11

Rate this solution

Exercise 13a

Exercise 22

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Step 1 1 of 4

To find the desired solutions we are firstly going to determine the volume that the given mass of gold can have under normal conditions. The volume is given as

$$V = \frac{m}{\rho} = \frac{29.34}{19.32} = 1.52\text{cm}^3$$

Step 2 2 of 4

a) To find the area of sheet 1μm thick, we divide the volume with the thickness

$$A = \frac{V}{d} = \frac{1.52 \times 10^{-6}\text{m}^3}{1 \times 10^{-6}\text{m}} = 1.52\text{m}^2$$

Where we have transferred the volume to m^3.

Step 3 3 of 4

b) The same procedure can be repeated for the case when we have a cylinder, but this time we will divide with the area of the cylinder's base $A = \pi r^2$ to obtain the length.

$$L = \frac{V}{A} = \frac{1.52 \times 10^{-6}}{3.14 \times 2.5^2 \times 10^{-12}}$$

$$L = 7.74 \times 10^4\text{m}$$

Result 4 of 4

a) $A = 1.52\text{m}^2$

b) $L = 7.74 \times 10^4\text{m}$

‹ Exercise 21

Rate this solution

Exercise 23 ›

Exercise 28

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Step 1 1 of 2

To prove this assumption let's calculate the Einstein's mass-energy relation

$$E = mc^2 = 1.66054 \times 10^{-27} \times 2.998^2 \times 10^{16}$$

$$E = 1.492 \times 10^{-10}\text{J}$$

To transfer the obtained energy to MeV we have to divide the value by the value of one MeV

$$E = \frac{1.492 \times 10^{-10}}{1.602 \times 10^{-13}}$$

$$E = 931.5\text{MeV}$$

NOTE: Pay attention to use the exact value for the speed of light.

Result 2 of 2

$$E = 931.5\text{MeV}$$

NOTE: Pay attention to use the exact value for the speed of light.

Exercise 27 Rate this solution Exercise 29