Verbal Problems Applied Worksheet

Astronomy:

1. The bright star Castor is about 45 light-years from Earth, the star Pollux about 33. How far are these stars from each other? These stars are the two important stars in the constellation Gemini and are quite close to each other in the sky. Use this information to get a close approximation to the distance between Castor and Pollux.
2. Here are some data about the Earth, Moon. And Sun.

	Diameter	Distance from Earth
Earth	8,000 mi	0
Moon	2,200 mi	240,000 mi
Sun	864,000 mi	93,000,000 mi

Suppose you wished to make a scale drawing of Earth, Sun, and Moon. If the Earth is represented by a circle with a diameter of 2 cm:

A) How far away will the Moon be?
B) How large will the Moon be?
C) How far away will the Sun be?
D) How large will the Sun be?

Geography:

3. The radius of Earth is about 6170 km. The highest point on the Earth (Mount Everest) is about 8850 m above sea level and the lowest point (Marianas Trench) is about 11,000 m below sea level. If these extremes were represented on a relief globe 30 cm in diameter, how high (and low) would they be?
4. In 1974 India had a population of 586 million and a net annual rate of population increase [births + immigration – deaths – emigration] of about 2%. If this rate remained the same, what might the population be in 1984?

Everyday Life (Travel):

5. The usual charge for traveler's checks is a fixed percentage of the face value. In May 1976, a bank offered a "Vacationer's Special": Up to $ 5,000 of traveler's check for a fixed $2.00 charge. This was described as a savings of "up to 96% of the usual charge." What is the usual charge for $5,000 of traveler's checks?

Health:

6. A proponent of natural foods recently claimed that each day there are 25 tons of aspirin consumed in the U.S. What does this mean in terms of aspirin tablets per person per day? Assume that one aspirin tablet contains 5 grains of aspirin, 1 lb. = 7000 grains (avoirdupois units), and U.S population is 210 million.
7. A person in a hospital is to be given 1000 cc of a 5% glucose solution intravenously over a period of 8 hours. The nurse adjusts the apparatus and checks the flow by counting the number of drops for one minute. If the flow is correct, how many drops should she count? (Assume 1 cc= 15 drops)

Environmental Science

8. The formula $C = (20t)^2 - 200t + 600$ describes the concentration C of bacteria per cubic centimeter in a body of water t days after treatment to show bacterial growth. After how many days will the concentration be 100 bacteria per cubic centimeter?
9. Trees are to be planted in a row. Their positions are recorded on a grid, and two of them are located at (0,-3) and (2,-1). If the third tree is planted at (7,6) will this tree be aligned (on the same line) with the other two?
10. The Antarctic glacier flows $84\frac{3}{5}$ yards in a week; the Greenland glacier flows $236\frac{9}{10}$ yards in the same time. How much farther does the Greenland glacier flow in a week?

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① 45 light yrs. (Castor)
- 33 light yrs. (Pollux)
12 light years (approx.)

② Earth:

Diameter = 2 cm

$\frac{8{,}000 \text{ mi.}}{2 \text{ cm}} = 4{,}000$ miles per 2 cms

$\frac{4{,}000 \text{ mi.}}{2 \text{ cm}} = 2000 \text{ mi/cm}$

Moon:

diameter = 2,200 mi.

$\frac{2{,}200 \text{ mi}}{x \text{ cm}} = \frac{2000 \text{ mi}}{1 \text{ cm}}$

$\frac{2000x \text{ mi/cm}}{2000 \text{ mi}} = \frac{2{,}200 \text{ mi}}{2000 \text{ mi}}$

(B) $x = 1.1$ cm

$\frac{240{,}000 \text{ mi}}{x \text{ cm}} = \frac{2000 \text{ mi}}{1 \text{ cm}}$

$\frac{(x)\,2000 \text{ mi/cm}}{2000 \text{ mi}} = \frac{240{,}000 \text{ mi/cm}}{2000 \text{ mi}}$

(A) $x = 120$ cm

Sun:

Distance from Earth: 93 million miles

$\frac{93{,}000{,}000 \text{ mi}}{x \text{ cm}} = \frac{2000 \text{ mi}}{1 \text{ cm}}$

$93{,}000{,}000 \text{ mi/cm} = 2000 \text{ mi } (x \text{ cm})$

(C) $x = 465{,}000$ cm

Diameter: 864,000 miles

$\frac{864{,}000 \text{ miles}}{x \text{ cm}} = \frac{2{,}000 \text{ mi}}{1 \text{ cm}}$

$864{,}000 \text{ miles} = 2000 \text{ mi } (x \text{ cm})$

(D) $x = 432$ cm

(3) $\frac{30 \text{ cm (diameter of relief globe)}}{2(6170 \text{ km})\text{(diameter of Earth)}} = \frac{x}{(2 \cdot 6170 \text{ km}) + 8850 \text{ km (highest pt of Mt. Everest)}}$

$$\frac{635{,}700}{12{,}340} = \frac{12{,}340x}{12{,}340}$$

$$x \cong 51.52 \text{ cm}$$

51.52 cm (Earth + Mt. Everest)
-30.00 cm (Earth diameter)
21.52

Mount Everest: 21.52 cm high

$$\frac{30 \text{ cm (diameter of relief globe)}}{12{,}340 \text{ (diameter of Earth)}} = \frac{x}{12{,}340 - 11{,}000 \text{ (Lowest pt. of Mariana's Trench)}}$$

$$30 \text{ cm } (1{,}340) = 12{,}340x$$

$$\frac{40200}{12{,}340} = \frac{12{,}340x}{12{,}340}$$

$$x = 3.26 \text{ cm}$$

Mariana's Trench: 3.26 cm below

(4) 1974 → 586,000,000 people in India

Net annual population increase → 2%

What will the population be in 10 years?

'75 → 586 million (.02) = 11,720,000

586,000,000
+ 11,720,000
597,720,000

'76 → 597,720,000 (.02) = 11,954,400

597,720,000
+11,954,400
609,674,400

'77 → 621,867,888

'78 → 634,305,245

'79 → 646,991,349

'80 → 659,931,175

'81 → 673,129,798

'82 → 686,592,393

'83 → 700,324,240

'84 → 714,330,724 people approximately

(5) May 1976 → $5 K check for $2.00 charge
→ Savings up to 96%.

usual charge:
$2.00 is 4% of what? → $\frac{4}{100} = .04$

hence, $\frac{2.00}{.04} = 50$

Usual charge: $50.00

(6) 25 tons of aspirin consumed/day → 50,000 lbs.

1 tablet = 5 grains of aspirin

1 lb = 7,000 grains

U.S. population = 210 million

# of tablets taken per person each day?

$\frac{7{,}000 \text{ grains}}{5 \text{ grains}} = 1400$ tablets in 1 lb.

$$\frac{350{,}000{,}000 \text{ grains}}{210 \text{ million people}} = \frac{5x \text{ grains}}{1 \text{ person}}$$

$$350 \text{ million} = 210 \text{ million } (5x)$$

$$\frac{350 \text{ million}}{105{,}000{,}000} = \frac{105{,}000{,}000\,x}{105{,}000{,}000}$$

$x \approx 3$ tablets of aspirin per person per day

(7) 1,000 cc of 5% glucose over 8 hours

$\frac{1{,}000\,cc}{8\,hours}$ 8 hours = 8(60 min) = 480 min

So, $\frac{1000\,cc}{480\,min} = \frac{x}{1\,min}$

$x \approx 2.08 = 2$ cc

Since 1 cc = 15 drops = 2 cc (15 drops / 1 cc) = **30 drops/min**

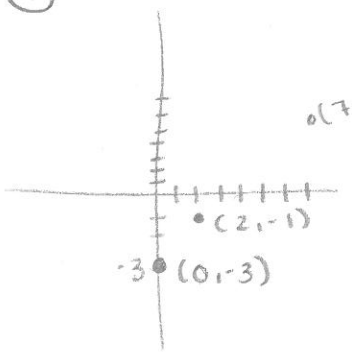
(8) $C = (20t)^2 - 200t + 600$

$100 = 400t^2 - 200t + 600$

$\frac{100}{200} = \frac{200}{200}(2t^2 - t + 3)$

$\frac{1}{2} = 2t^2 - t + 3$

(9)



$y = mx + b$

slope: $m = \frac{(y_2 - y_1)}{(x_2 - x_1)} = \frac{-3 - -1}{0 - 2} = \frac{-3 + +1}{-2} = \frac{-2}{-2} = \frac{1}{1} = 1$

$m = 1 \rightarrow y = x + b$ using point $(0, -3)$ to find b

$-3 = 0 + b$

$b = -3$

So $y = x - 3$

Plug in (7,6) to see if (7,6) lies on the line:

$6 = 7 - 3$

$6 \neq 4$ ✗

No, (7,6) would not lie on the same line.

(5)

(10) $84\frac{3}{5} = 84.6$ yards per week → Antarctic glacier

$236\frac{9}{10} = 236.9$ yards per week → Greenland glacier

How much further does the Greenland glacier flow a week?

$$\begin{array}{r} {}^{1}\cancel{2}{}^{13}\cancel{3}6.9 \\ -\ 84.6 \\ \hline 152.3 \end{array}$$

The Greenland glacier flows 152.3 more yards per week.