Algebra II H
Algebraic Models / Word Problems – Review Sheet

1. Give an algebraic expression for: "the product of six and the sum of a number and four, all divided by nine.

$$\frac{6(n+4)}{9}$$

2. Give an algebraic expression for: "the sum of the squares of two consecutive odd integers." Simplify your result.

$$n^2 + (n+2)^2 = 2n^2 + 4n + 4$$

3. The quotient of five times one more than a number and seven.

$$\frac{5(n+1)}{7}$$

4. Ten less than four times a number is 42. Find the number.

$$4n - 10 = 42 \qquad 4n = 52 \qquad \boxed{n = 13}$$

5. The sum of two numbers is 26. The larger number is one less than twice the smaller number. Find the smaller number.

$$\ell = 2s - 1 \qquad s + 2s - 1 = 26$$
$$3s = 27 \qquad \boxed{s = 9 \quad \ell = 17}$$

6. Pat invests $18,000 in two funds paying 9-1/4% and 10-1/2% simple interest. How much did she invest @ 9-1/4% if the total yearly interest is 1,827.50?

$$x = 5000$$
$$18,000 - x \,\, \$13,000 \qquad .0925(x) + (18000 - x)(.105) = 1827.50$$
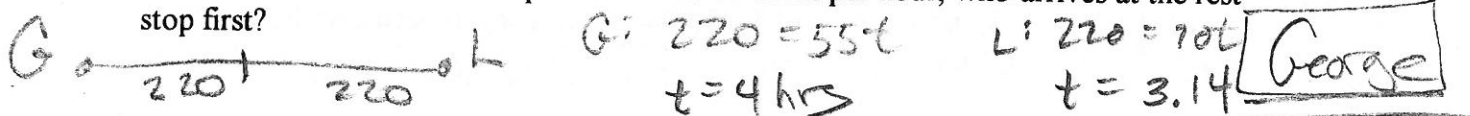$$-.0125 = -125$$
$$x = 5000$$

7. Ed invested $8,000 in one fund. His wife invested $10,000 in another. The interest rate paid by Ed's fund is 2-1/2% more than the rate paid by his wife's fund. Together, after one year their combined investments totaled $19,055. What rate of interest did Ed's fund pay?

$$r : rate \quad \boxed{Ed = 7\%}$$
$$8000(r + .025) + 10,000(r) = 1,055$$
$$18000r + 200 = 1055 \quad \text{wife} \quad \boxed{r = 4.75\%}$$

8. George and Laura live 440 miles apart. They plan to meet at a rest stop that lies exactly half way between them. If George leaves at noon and drives 55 miles per hour and Laura leaves at 1:00pm and drives 70 miles per hour, who arrives at the rest stop first?

$$G \xrightarrow{\quad 220 \quad t \quad} \xleftarrow{\quad 220 \quad} L$$
$$G: 220 = 55t \qquad L: 220 = 70t \qquad \boxed{George}$$
$$t = 4 \, hrs \qquad t = 3.14$$

9. A kilometer is approximately 0.6 miles. About how many inches are there in two kilometers?

$$1 \, mile = 5,280 \, ft.$$
$$63360(1.2) = \boxed{76,032}$$

10. A truck driver averaged 60 mph on a 600 mile trip and averaged 40 mph on the return trip. What was the average speed for the entire round trip?

$$\boxed{r = 48 mph}$$
$$d = r \cdot t$$
$$1200 = r(10 + 15)$$
$$\frac{1200 \, miles}{25}$$

11. Your weekly gross income after a 2.3% cost of living raise is $593.34. What was your income before the raise?

$$x(1.023) = 593.34$$
$$\boxed{x = \$580}$$

$426.45

12. The list price of your purchase is $492.95. If you are entitled to an 18% discount, and the sales tax is 5.5%, how much do you pay?

$$\boxed{\$426.45}$$

60.46"

13. The annual snowfall decreased by 12% from last year's record of 68.7 inches. What was this year's snowfall?

$$68.7\,(.88) = \boxed{60.46"}$$

$5/lb

14. A grocer mixes four pounds of nuts, costing $9 per pound, with sixteen pounds of nuts costing $4 per pound. What is the cost per pound of the combined mixture?

$$4\ lb\ @\ \$9 \qquad 16\ lb\ @\ \$4 \qquad \boxed{\frac{36+64}{20} \quad @\ \$5 \quad 20\ lbs}$$

150 oz.

15. How many ounces of pure antifreeze must be added to 100 ounces of water to obtain a 60% solution (i.e., one that contains 60% antifreeze?)

$$X = \text{pure antifreeze} \qquad \boxed{X = 150}$$

$$X + 0(100) = .60\,(100+X)$$
$$X = 60 + .60X$$
$$.40X = 60$$

8,840 units

16. A company has fixed costs of $10,000 per month and variable costs of $9.75 per unit manufactured. If the company incurred $96,190 in costs during January, how many units did it manufacture that month?

$$10,000 + 9.75(X) = 96,190$$
$$X = 8840$$

$21,488

17. Sally invested $10,000 over a ten year period. She put the initial investment in a fund that grew at 7.5% per year. After 4 years, she moved the entire amount to another fund that earned 8.25% per year. How much was her investment worth at the end of the ten year period?

$$10,000\,(1.075)^4 = \qquad 13,354.69 \times (1.0825)^6 = 21,488.-$$

Choice (a)

18. Which investment is better over a 15 year period: (a) one that pays 5.75% interest compounded annually or (b) one that pays 5.5% interest compounded quarterly? Justify your answer.

$$2.313$$
$$2.269 \qquad \left(1 + \frac{.055}{4}\right)^{4 \cdot 15}$$

28%
$75,000
36%
90,000

19. Best Buy sells two types of Ipods. The profit margin for the Basic model is 28%, while the margin for the Deluxe model is 36%. During September, the store made a profit of $53,400 on total sales of $165,000. How many of each unit did it sell?

$$-.08X = -6000 \qquad .28X + .36\,(165,000 - X) = 53,400$$

choice (i)

20. You are offered a choice of two annual compensation packages: (i) a base pay of $25,000 plus a commission of 4.5% of gross sales or (ii) a base pay of $35,000 plus a commission of 3% of gross sales. If you expect to sell $700,000 during the year, which compensation package should you choose? Justify your answer.

$$\longrightarrow 25,000 + .045\,(700,000) = 56,500 \ \text{\textsterling}$$
$$35,000 + .03\,(700,000) = 56,000$$