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Math 1020, Exam #2, Fall 2013 Name KEY

Instructions: Show all work. Draw diagrams to help organize the data (this is worth partial credit). Use exact answers unless specifically asked to round.

1. Solve the formulas below for the specified variable. (6 points each)

a. $C = \frac{5}{9}(F - 32)$, for F. $\times \frac{9}{5}$

$\frac{9}{5}C = F - 32 \Rightarrow F = \frac{9}{5}C + 32$

$+32 \quad +32$

b. $V = \frac{1}{3}\pi r^2 h$, for h. $\times 3$

$\frac{3V}{\pi r^2} = \frac{\pi r^2 h}{\pi r^2} \Rightarrow h = \frac{3V}{\pi r^2}$

c. $2x - 3y = 14$, for y.

$-2x \quad -2x$

$\frac{-3y}{-3} = \frac{14 - 2x}{-3} \Rightarrow y = \frac{2x - 14}{3}$ or $y = \frac{2}{3}x - \frac{14}{3}$

d. $A = P + Prt$, for P.

$\frac{A}{1+rt} = \frac{P(1+rt)}{1+rt} \Rightarrow P = \frac{A}{1+rt}$

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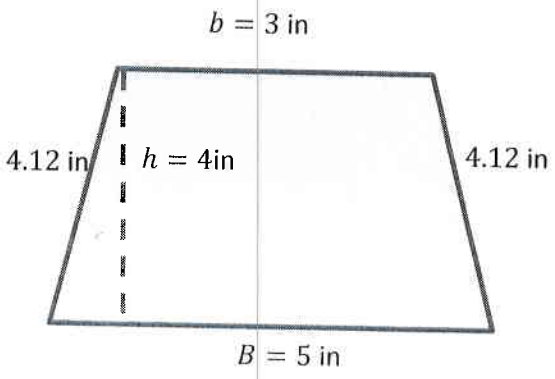
2. The area formula for a trapezoid is given by $A = \frac{1}{2}h(B + b)$. Find the area and perimeter of the trapezoid shown below. (8 points)

$A = \frac{1}{2} \cdot 4 (5+3) = \boxed{16}\ in^2$

$P = 3 + 4.12 + 5 + 4.12$

$= \boxed{16.24}\ in$

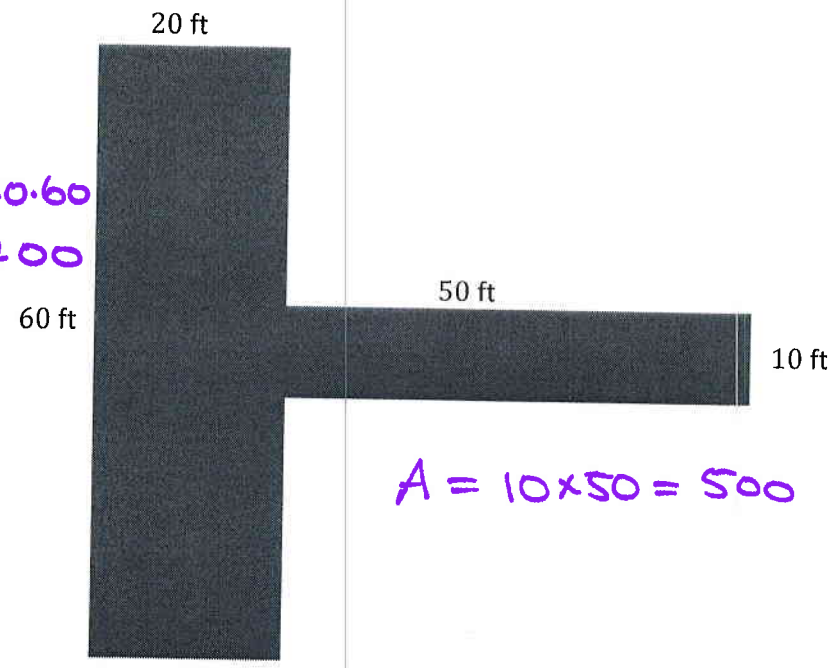


3. A city decides to build a new pier with a long dock, and a boardwalk area on the shore in the configuration shown below. Both sections will need to be laid down with wood planks. Find the area of the region to be constructed. (6 points)

$A = 20 \cdot 60 = 1200$

$A_1 + A_2 = 1200 + 500$

$= \boxed{1700}\ ft^2$



$A = 10 \times 50 = 500$

4. Translate the following statements into algebraic expressions. (Do not solve.) (4 points each)

a. The quotient of a number and 7

$\frac{x}{7}$

b. A number subtracted from 8

$8-x$

c. The sum of twice a number and 5

$2x+5$

d. Three times the sum of a number and 4

$3(x+4)$

e. 50 less than half a number is the same as twice the number and one.

$\frac{1}{2}x-50 = 2x+1$

f. 49 is less than twice a number.

$49 < 2x$

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5. The sum of three consecutive integers is 72. Find all three integers. (5 points)

$n, n+1, n+2$

$(n)+(n+1)+(n+2) = 3n+3 = 72$

$-3 \quad -3$

$\frac{3n}{3} = \frac{69}{3}$

$n = 23$

$n = 23$
$n+1 = 24$
$n+2 = 25$

6. A paperback edition of a book costs $12.50 less than the hardback edition of the book. If you purchase one of each edition, you will pay $37.40. Find the cost of the paperback edition of the book. (5 points)

$P = h - 12.50$

$(h - 12.50) + h = 37.40$

$2h - 12.50 = 37.40$

$+12.50 \quad +12.50$

$\frac{2h}{2} = \frac{49.90}{2}$

$h = \$24.95$

paperback costs

$\$12.45$

7. Going into the final exam, which is worth two test grades, Brooke has test scores of 80, 83, 71, 61 and 95. What score does Brooke need to score on the final exam in order to have an average of 80? (5 points)

2 "tests" to go + 5 given = 7

$\frac{80+83+71+61+95+2x}{7} = 80 \quad) \times 7$

$390 + 2x = 560$

$-390 \quad -390$

$\frac{2x}{2} = \frac{170}{2} \Rightarrow x = 85$ on the final

8. Find the missing values in the following percent problems. (4 points each)
   a. 7% of what number is 200?

$.07x = 200$

$x = \frac{20000}{7} \approx 2857.14$

   b. 60% of 120 is what number?

$.6 * 120 = x$ $\quad \boxed{x = 72}$

   c. 4 is what percent of 20?

$\frac{20 \cdot x}{20} = \frac{4}{20} \Rightarrow x = 0.2 =$

$\boxed{20\%}$

9. In a certain county, the sales tax is 5.5%. A man purchases a used car for $8440 including tax. What was the sticker price of the car? (7 points)

$x + 0.055x = 8440$

$\frac{1.055x}{1.055} = \frac{8440}{1.055}$

$\boxed{x = \$8000}$

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10. Your current consulting position pays you $77,000 each year. A competing firm has offered you $86,000 to join it. To the nearest tenth of a percent, what percent increase in salary would you receive if you switched firms? (7 points)

$86{,}000 - 77{,}000 = 9000$

$\frac{9{,}000}{77{,}000} = \frac{9}{77} \approx .116883\ldots$

$\approx 11.7\%$

11. Find the values of each angle in the triangle below. (8 points)

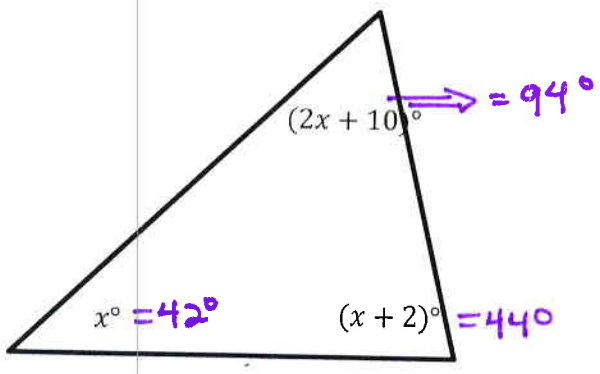
$(2x+10) + x + (x+2) = 180$

$4x + 12 = 180$

$-12 \quad -12$

$\frac{4x}{4} = \frac{168}{4}$

$x = 42$



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12. Max lives on a river 30 miles from town. Max travels downstream (with the current) at 20 mph. Returning upstream (against the current), his rate is 12 mph. If the total trip to town and back took 4 hours, how long did his upstream trip take? (8 points)

$d = rt \Rightarrow t = \frac{d}{r}$

$\frac{30}{20} + \frac{30}{12} = t_{total} = 4$

downstream → ← upstream

$\frac{30}{20} = 1.5$ hrs $\boxed{\frac{30}{12} = 2.5 \text{ hrs}}$

13. If you have an angle that is 75°, give an angle that is: (3 points each)
    a. Complementary

15°

    b. Supplementary

105°

    c. Congruent

75°

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14. Explain why it's not possible for two angles in a triangle to be obtuse. (5 points)

obtuse angles are bigger than 90°
but all the angles in a triangle are summing to only 180°. Consider 2 angles of 91°
91° + 91° = 182° and we still need a third angle.
So this is not possible.

15. A sales manager received a 13% increase in salary over last year and now he makes $68,930. He's forgotten his old salary and wishes to calculate it. He sets up the problem as shown below. Explain what is wrong with his reasoning. (7 points)

$68,930 × 0.13 = $8960.90
Therefore, his old salary was
$59,969.10.

This is wrong because he subtracted 13% of his new salary, and this is more than 13% of his old salary, which the increase was based on. If you run the process in reverse, it won't check

$59,969.10 × 0.13 = $7795.98
59,969.10 + 7795.98 = $67,765.08
which isn't the salary he has now.
to be valid, it must check out.