Proportions test Name_____

Solve each of the following

1. $\frac{x+5}{3}=\frac{7}{3}$ (Exact answer NO Decimals)

$3(x+5)=3(7)$
$3x+15=21$
$3x=21-15$
$3x=6$
$\frac{3x}{3}=\frac{6}{3}$
$x=2$

1. $x=2$

2. $\frac{3a-2}{5}=\frac{20}{-3}$ (Exact answer NO Decimals)

$-3(3A-2)=5(20)$
$-9A+6=100$
$-9A=100-6$
$\frac{-9A}{-9}=\frac{94}{-9}$
$A=-10\frac{4}{9}$

$A=-10\frac{4}{9}$

2. $A=-10\frac{4}{9}$

3. $\frac{4k}{7-2k}=\frac{2}{5}$ (Exact answer NO Decimals)

$5(4k)=2(7-2k)$
$20k=14-4k$
$20k+4k=14$
$\frac{24k}{24}=\frac{14}{24}$
$k=\frac{7}{12}$

$k=\frac{7}{12}$

3. $k=\frac{7}{12}$

4. $\frac{5g+7}{3g-5}\leq\frac{-2}{5}$ (Exact answer NO Decimals and **Set Building Notation**)

$5(5g+7)\leq -2(3g-5)$
$25g+35\leq -6g+10$
$25g+6g\leq 10-35$
$31g\leq -25$
$g\leq -\frac{25}{31}$

$\{g \mid g\leq -\frac{25}{31}\}$

4. $\{g \mid g\leq -\frac{25}{31}\}$

5. $\left[\frac{4b+3}{9}<\frac{3b+2}{5}+\frac{5b-9}{7}\right]$ (Exact answer NO Decimals and **Set Building Notation**)

$9(5)(7)$
$35(4B+3)<63(3B+2)+45(5B-9)$
$140B+105<189B+126+225B-405$
$140B+105<414B-279$
$105+279<414B-140B$
$\frac{384}{274}<\frac{274B}{274}$
$1\frac{55}{137}<B$

$\{B \mid B>1\frac{55}{137}\}$

5. $\{B \mid B>1\frac{55}{137}\}$

Solve each application of direct variation. $x = 64.02$

6. A driver paid \$37.83 to fill a 13 gallon gas tank. How much would it cost to fill a 22 gallon tank?

$$\frac{37.83}{x} = \frac{13}{22}$$
$$22(37.83) = 13x$$
$$\frac{832.26}{13} = \frac{13x}{13}$$

6. $x = \$64.02$

7. A man 6.3 feet tall casts a shadow 4.8 feet long. How tall would a certain hairy creature be if it casts a shadow 5.7 feet at the exact same moment in time?

$$\frac{6.3}{x} = \frac{4.8}{5.7}$$
$$5.7(6.3) = 4.8x$$
$$\frac{35.91}{4.8} = \frac{4.8x}{4.8}$$

$x = 7.5$

7. $x = 7.5$ ft

Solve using the proportion

8. 12 is 65% of what number? (Exact answer NO Decimals)

$$\frac{IS}{OF} = \frac{\%}{100}$$
$$\frac{12}{x} = \frac{65}{100}$$
$$12(100) = 65x$$
$$\frac{12(100)}{65} = x$$

$x = 18\frac{6}{13}$

8. $x = 18\frac{6}{13}$

9. 5 is what **percent** of 25? (Exact answer NO Decimals)

$$\frac{5}{25} = \frac{x}{100}$$
$$\frac{5(100)}{25} = x$$

$x = 20\%$

9. $x = 20\%$

10. 24 is 20% of what number? (Exact answer NO Decimals)

$$\frac{24}{x} = \frac{20}{100}$$
$$\frac{24(100)}{20} = \frac{20x}{20}$$

$x = 120$

10. $x = 120$

Solve using the **literal translation** (inline equation) , write your answers in **decimal form**.

11. 37 is 26% of what number? (Round to the **nearest tenth**)

$$37 = .26N$$
$$\frac{37}{.26} = N$$

$N = 142.3$

11. $N = 142.3$

12. What number is 44% of 217? (Round to the **nearest tenth**)

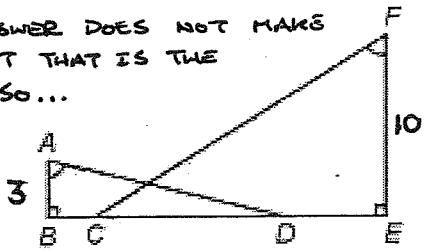
$$N = .44(217)$$

$N = 95.5$

12. $N = 95.5$

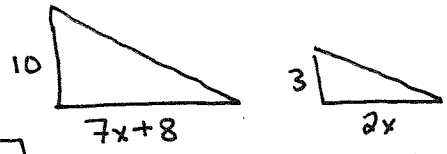
Using Similar Triangles, Write and solve a proportion to find the indicated side.

* NEGATIVE ANSWER DOES NOT MAKE SENSE, BUT THAT IS THE RESULT SO...



BD and *CE*

(Exact answer NO Decimals)



$BD = 2x$

$CE = 7x + 8$

$2(-24) = -48$

$7(-24) + 8 = -160$

$\frac{10}{3} = \frac{7x+8}{2x}$

$20x = 21x + 24$

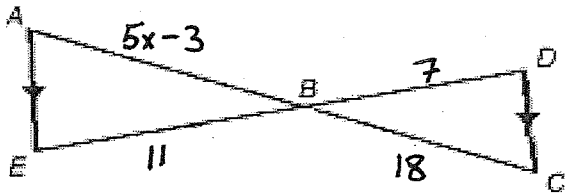
$-24 = 21x - 20x$

$-24 = x$

13. BD = **-48**

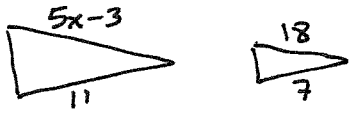
13. CE = **-160**

$5(6\frac{9}{35}) - 3 = 28\frac{2}{7}$



AB

(Exact answer NO Decimals)



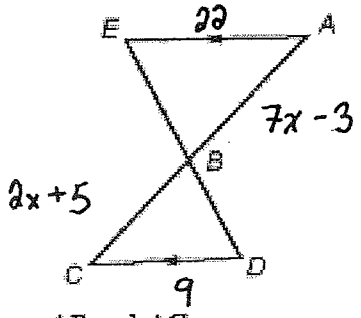
$\frac{5x-3}{11} = \frac{18}{7}$

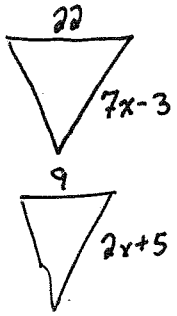
$35x - 21 = 198$

$35x = 219$

$x = 6\frac{9}{35}$

14. AB = **$28\frac{2}{7}$**





AB and *AC*

(Exact answer NO Decimals)

$\frac{22}{7x-3} = \frac{9}{2x+5}$

$22(2x+5) = 9(7x-3)$

$44x + 110 = 63x - 27$

$110 + 27 = 63x - 44x$

$137 = 19x$

$7\frac{4}{19} = x$

15. AB = **$47\frac{9}{19}$**

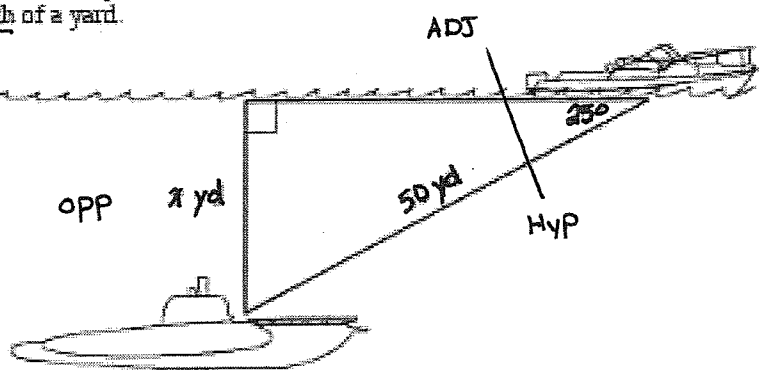
15. AC = **$66\frac{17}{19}$**

$\overline{AB} = 7(7\frac{4}{19}) - 3 = 47\frac{9}{19}$

$\overline{AC} = 9(7\frac{4}{19}) + 2 = 66\frac{17}{19}$

Some Trigonometry Ideas

139. There is a 25° angle between the surface and the direction from the speedboat to a trailing submarine. It is a distance of 50 yards from the boat to the submarine. How deep is the submarine? Round to the nearest tenth of a yard.



SIN 25° = $\frac{x}{50}$

50 SIN 25° = x

21.1

16. $x = 21.1$ yd

17. a. $\sin 25^\circ =$ (four decimal places) 17a. .4226

b. $\tan 50^\circ =$ (four decimal places) 17b. 1.1918

c. $\cos 18^\circ =$ (four decimal places) 17c. .9511

d. $\tan 87^\circ =$ (four decimal places) 17d. 19.0811

e. $\sin 45^\circ =$ (four decimal places) 17e. .7071

f. $\cos 68^\circ =$ (four decimal places) 17f. .3746

Percent of change problems, *be sure to* **adjust** *your answers to reflect the* **change** *from 100%* write your answers to the **nearest whole number**

18. New Price \$345 $\frac{\text{NEW}}{\text{ORIG}} = \frac{\%}{100}$ $\frac{345}{276} = \frac{x}{100}$ 18. 25% INCREASE

Original Price \$276

(To the nearest percent what is the percent of change)

$\frac{345(100)}{276} = x$

$125 = x$

$125 - 100$

25% INCREASE

19. New Price \$281 19. 25% DECREASE

Original Price \$377

(To the nearest percent what is the percent of change)

$\frac{281}{377} = \frac{x}{100}$

$\frac{281(100)}{377} = x$

$74.5358 = x$

$74.5358 - 100$

25% DECREASE

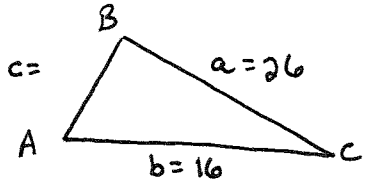
More Similar Figures

20. $\Delta ABC \sim \Delta DEF$ (find the sides to the nearest tenth)
(NO TRIG, DRAW ONE BIG ONE LITTLE TRIANGLE)

20 c = 33.4

20 e = 4.3

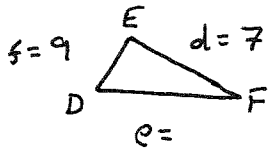
a = 26
b = 16
d = 7
f = 9



$\frac{26}{7} = \frac{c}{9}$

$\frac{26(9)}{7} = c$

$33.4 = c$



$\frac{7}{26} = \frac{e}{16}$

$\frac{7(16)}{26} = e$

$4.3 = e$

Final Purchase Price

21. Fishing rod and reel $185.32
closeout discount 100 − 27% = 73
student discount 100 − 13% = 87
sales tax 100 + $6\frac{1}{8}\%$ = 106 1/8

185.32(.73)(.87) (1.06125)

= $124.91

21 $124.91

What is the final price to the nearest cent?

22. Magic Cool Beans $185.32
closeout discount 100 − 24% = 76
student discount 100 − 12% = 88
sales tax 100 + $7\frac{5}{11}\%$ = 107 5/11

185.32(.76)(.88)(1.07$\overline{45}$)

= $133.18

22 $133.18

What is the final price to the nearest cent?

23. Turtle & Cheese Pies $44.32
closeout discount 100 − 33% = 67
student discount 100 − 8% = 92
sales tax 100 + $5\frac{3}{8}\%$ = 105 3/8

44.32(.67)(.92)(1.05375)

= $28.79

23 $28.79

What is the final price to the nearest cent?

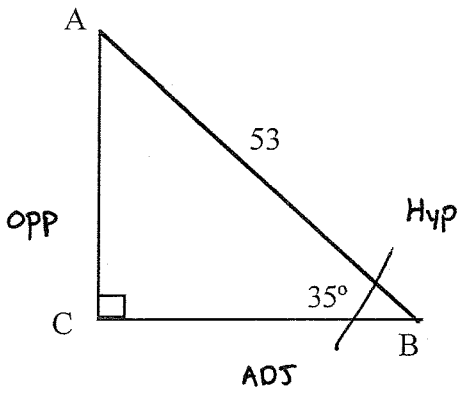
More Trigonometry

24. Solve this triangle using trig
(find the sides to the nearest tenth)

24 A = 55°

24 a = 43.4

24 b = 30.4



$\sin 35° = \frac{b}{53}$ $\cos 35° = \frac{a}{53}$

$53 \sin 35° = b$ $53 \cos 35° = a$

$30.4 = b$ $43.4 = a$

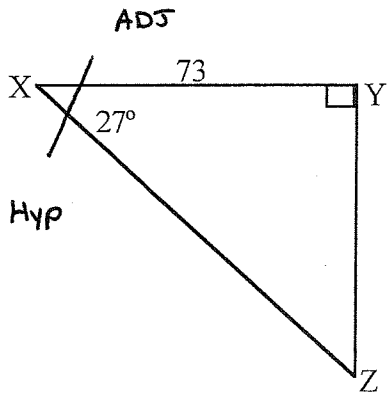
$\angle A = 55°$

25. Solve this triangle using trig
(find the sides to the nearest tenth)

25 x = 37.2

25 y = 81.9

25 Z = 63°



$\cos 27° = \frac{73}{y}$ $\tan 27° = \frac{x}{73}$

$y = \frac{73}{\cos 27°}$ $73 \tan 27 = x$

$y = 81.9$ $37.2 = x$

$\angle Z = 63°$

Solving Equations

26. Solve the equation (Exact answers NO Decimals)

12 $\left[\frac{2}{3}(5z-7)+\frac{1}{2}=\frac{3}{4}(7z-2)-\frac{1}{3}\right]$

$8(5x-7)+6 = 9(7x-2)-4$

$40x-56+6 = 63x-18-4$

$40x-50 = 63x-22$

$-50+22 = 63x-40x$

$-28 = 23x$

$x = -1\frac{5}{23}$

26. $z = -1\frac{5}{23}$

27. Solve the equation (HUNDREDTHS PLACE)

$$\frac{\frac{4}{7}f-\frac{2}{3}}{\frac{3}{4}f+\frac{4}{5}}=\frac{4\frac{1}{2}}{7\frac{2}{3}}$$

$7\frac{2}{3}(\frac{4}{7}f-\frac{2}{3})=4\frac{1}{2}(\frac{3}{4}f+\frac{4}{5})$

$4\frac{8}{21}f-5\frac{1}{9}=3\frac{3}{8}f+3\frac{3}{5}$

$4\frac{8}{21}f-3\frac{3}{8}f=3\frac{3}{5}+5\frac{1}{9}$

$1\frac{1}{168}f=8\frac{32}{45}$

$f=8.66$

27. 8.66

28. The surface area of a rectangular solid is given by the formula $s=2lw+2lh+2wh$. Find the width of a particular solid that has a surface area of $257\frac{1}{4}$, a length of $3\frac{1}{4}$, and a height of $9\frac{1}{2}$. (Exact answer NO Decimals)

$257\frac{1}{4}=2(3\frac{1}{4})w+2(3\frac{1}{4})(9\frac{1}{2})+2(w)(9\frac{1}{2})$

$257\frac{1}{4}=6\frac{1}{2}w+61\frac{3}{4}+19w$

$257\frac{1}{4}=25\frac{1}{2}w+61\frac{3}{4}$

$257\frac{1}{4}-61\frac{3}{4}=25\frac{1}{2}w$

$195\frac{1}{2}=25\frac{1}{2}w$

$W=7\frac{2}{3}$

28. $W=7\frac{2}{3}$

29. $9(3-t)+3t=30$ (Exact answer NO Decimals)

$27-9t+3t=30$

$27-6t=30$

$-6t=30-27$

$\frac{-6t}{-6}=\frac{3}{-6}$

$t=-\frac{1}{2}$

29 $t=-\frac{1}{2}$

30. $4(2f+3)-4f=13$ (Exact answer NO Decimals)

$8f+12-4f=13$

$4f+12=13$

$4f=13-12$

$4f=1$

$f=\frac{1}{4}$

30 $f=\frac{1}{4}$

31. $\frac{3}{5}(5t-40)+8t=\frac{-2}{3}(6t-9)+5$ (Exact answer NO Decimals)

$3t-24+8t=-4t+6+5$

$11t-24=-4t+11$

$11t+4t=11+24$

$\frac{15t}{15}=\frac{35}{15}$

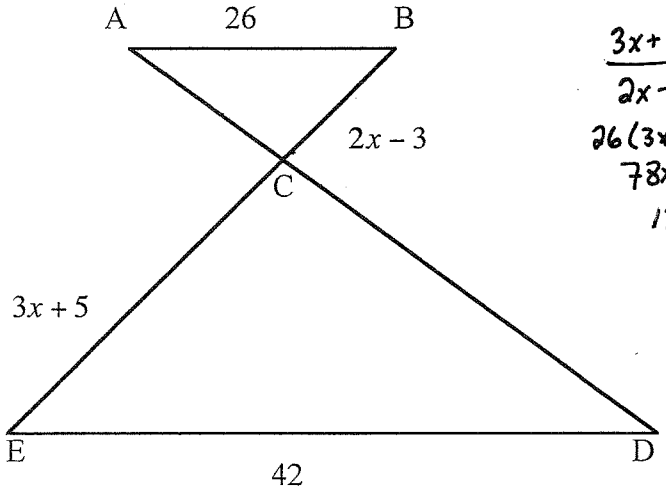
$t=2\frac{1}{3}$

31 $t=2\frac{1}{3}$

32. Find BC and BE
(Exact answer NO Decimals)

32 BC = $82\frac{1}{3}$

32 BE = $215\frac{1}{3}$



$\frac{3x+5}{2x-3} = \frac{42}{26}$

$26(3x+5) = 42(2x-3)$

$78x + 130 = 84x - 126$

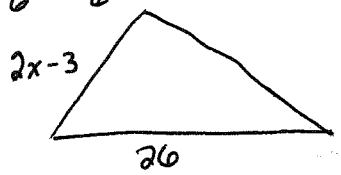
$130 + 126 = 84x - 78x$

$\frac{256}{6} = \frac{6x}{6}$

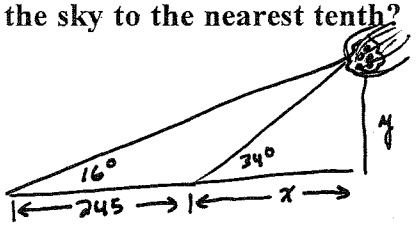
$x = 42\frac{2}{3}$

$BC = 2(42\frac{2}{3}) - 3 = 82\frac{1}{3}$

$BE = 5(42\frac{2}{3}) + 2 = 215\frac{1}{3}$



#33 A near earth object was recently sighted by a telescope. The object passed in the sky and one telescope sighted the object when the telescope was set at an angle of 34° with the ground. A second telescope 245 miles mile away from the first also witnessed the object in the sky at the same time. The second telescope was set at an angle of 16° with the ground. **How high was the object on the sky to the nearest tenth?**



I. $\tan 34° = \frac{y}{x}$

$x \tan 34° = y$

II $\tan 16° = \frac{y}{x+245}$

$(x+245)\tan 16° = y$

III

$x \tan 34° = x \tan 16° + 245 \tan 16°$

$x \tan 34° - x \tan 16° = 245 \tan 16°$

$x(\tan 34° - \tan 16°) = 245 \tan 16°$

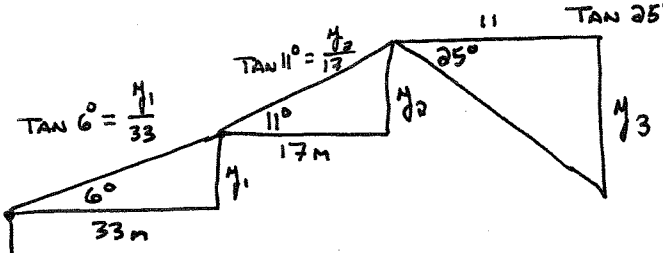
$x = \frac{245 \tan 16°}{\tan 34° - \tan 16°} = 181.174\ldots$

IV $181.174\ldots (\tan 34°) = y$

$122.2 = y$

33. $y = 122.2$ MILES

#34 A hot air balloon was 1.9 miles above the ground. The operator set a course to ascend at 6° for 33 horizontal miles. Then the operator set a course to ascend at 11° for 17 horizontal miles. The temperature began to fall at such an altitude, so the balloon ended up descending at an angle of 25° for 11 miles. **What is the current altitude of the balloon to the nearest hundreth?**



$1.9 + 33 \tan 6° + 17 \tan 11° - 11 \tan 25° = 3.54$ MILES

34. 3.54 MILES