Integrated 2- Mid-term Study guide 2018 Name KEY

1. A student followed the steps below to solve the given equation. Did they solve this correctly? If not, where is the mistake?

Given: $5x^2 + 13 = 18$
Step 1: $5x^2 = 5$
Step 2: $x^2 = 25$
Step 3: $x = \pm 5$

2. Which of the following expressions are equivalent to $\sqrt[7]{x^5}$?

a. $\frac{x^5}{x^7}$ b. $\frac{x^7}{x^5}$ c. $(x^{\frac{1}{5}})^7$ d. $(x^{\frac{1}{7}})^5$

$x^{\frac{5}{7}}$ $\frac{1}{7} \cdot \frac{5}{1} = \frac{5}{7}$

3. Greg is making a rectangular table. The length of the table is 9 inches greater than its width, w, in inches. Write the function, f(w), that describes the **area**, in square inches, of Greg's table as a function of the width, w. Also find the **perimeter** of the table.

4. Julie is making a rectangular quilt. The length of the quilt is 5 inches greater than its width, w, in inches. Write the function, f(w), that describes the **area**, in square inches, of Julie's quilt as a function of the width, w. Also, find the **perimeter** of the quilt.

5. The length of one side of a box is 5 centimeters more than three times the width. The base of the shoebox has an area of 65 square centimeters. Write an equation to represent this situation with *w* representing the width in centimeters.

* $4x^3+32x^2+10x+80$ * $2x^3-9x^2-27x+54$ * $15x^5+10x^4-6x^3-4x^2$

6. Multiply the following polynomials.

a. $(x + 8)(4x^2 + 10)$

	$4x^2$	10
x	$4x^3$	$10x$
8	$32x^2$	80

b. $(x - 6)(2x^2 + 3x - 9)$

	$2x^2$	$3x$	-9
x	$2x^3$	$3x^2$	$-9x$
-6	$-12x^2$	$-18x$	54

c. $(3x^2 + 2x)(5x^3 - 2x)$

	$5x^3$	$-2x$
$3x^2$	$15x^5$	$-6x^3$
$2x$	$10x^4$	$-4x^2$

7. Simplify the expressions.

a. $(2x^4 - 3x^2 - 7) + (3x^3 + 5x + 4)$

* $2x^4+3x^3-3x^2+5x-3$

b. $(2x^4 - 3x^2 - 7) - (3x^3 + 5x + 4)$

$2x^4-3x^3-3x^2-11$

$2x^4 \quad -3x^2 \quad -7$
$-3x^3 \quad -5x \quad -4$
* $2x^4-3x^3-3x^2-5x-11$

8. $H(x) = 2x - 4$
$K(x) = 4x^3 - 7x$
$M(x) = 2x^2 + x - 5$
$N(x) = 4x^2 - 8x + 2$
$P(x) = 3x - 4x^{-2}$ NO

Find the following:

a. $A(x)=H(x) + N(x)$

$2x-4$
$4x^2-8x+2$
* $4x^2-10x-2$

b. $B(x)=H(x) - N(x)$

$2x-4$
$-4x^2+8x-2$
* $-4x^2+10x-6$

c. $C(x)= K(x) - H(x) + M(x)$

$4x^3 \quad -7x$
$2x^2 \quad -2x \quad +4$
$2x^2 \quad +x \quad -5$
* $4x^3+2x^2-8x-1$

*

$8x^3 - 32x^2 + 36x - 8$ * $4x^2 - 16x + 16$

	$2x^2$	x	-5
$-3x$			
-4			

x^2

d. $D(x) = H(x) \cdot N(x)$

	$4x^2$	$-8x$	2
$2x$	$8x^3$	$-16x^2$	$4x$
-4	$-16x^2$	$32x$	-8

e. $F(x) = [H(x)]^2$

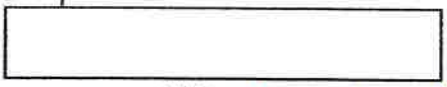
	$2x$	-4
$2x$	$4x^2$	$-8x$
-4	$-8x$	16

f. $G(x) = M(x) \cdot P(x)$

	$2x^2$	x	-5
$2x$	$4x^3$	$2x^2$	$-10x$
-4	$-8x^2$	$-4x$	20

* $4x^3 - 6x^2 - 14x + 20$ Area

9. Given the rectangle, determine the area and perimeter written as a polynomial.



$2x - 4$ $2x^2 + x - 5$

$P = 2x - 4 + 2x + 4 + 2x^2 + x - 5 + 2x^2 + x - 5 = 4x^2 + 6x - 18$

10. Evaluate the above area and perimeter at x = 4 yards.

$A = 4(4)^3 - 6(4)^2 - 14(4) + 20 =$

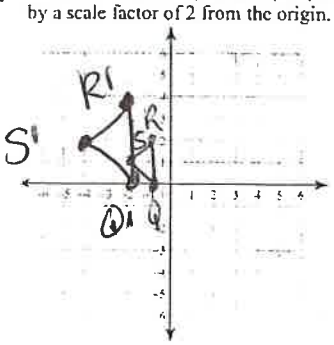
$P = 4(4)^2 + 6(4) - 18 =$

11. The table below shows the coordinates of triangle RST and the coordinates of R' in triangle R'S'T'. Triangle R'S'T' is a dilation of triangle RST.

times 3

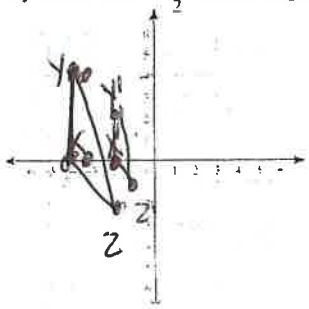
Triangle RST		Triangle R'S'T'	
R	(–2, –3)	R'	(–6, –9)
S	(0, 2)	S'	(0, 6)
T	(2, –3)	T'	(6, –9)

12. Dilate ΔQRS if Q(-1,0), R(-1,2), S(-2,1) by a scale factor of 2 from the origin.



Q' (-2, 0)
R' (-2, 4)
S' (-4, 2)

Dilate ΔXYZ if X(-4,0), Y(-4,4), Z(-2,-2) by a scale factor of $\frac{1}{2}$ from the origin.



X' (-2, 0)
Y' (-2, 2)
Z' (-1, -1)

13. When ΔABC is dilated by a scale factor of 2, its image is $\Delta A'B'C'$. Which statement is true?

(1) $\overline{AC} \cong \overline{A'C'}$ NO

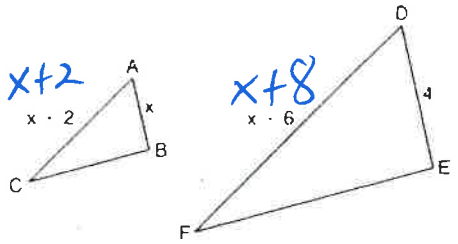
(2) $\angle A \cong \angle A'$ YES

(3) perimeter of ΔABC = perimeter of $\Delta A'B'C'$ NO

(4) 2(area of ΔABC) = area of $\Delta A'B'C'$ NO

Angles $\cong$

14. In the diagram below, $\Delta ABC \sim \Delta DEF$, $DE = 4$, $AB = x$, $AC = x + 2$, and $DF = x + 8$. Determine the length of $\overline{AB}$.

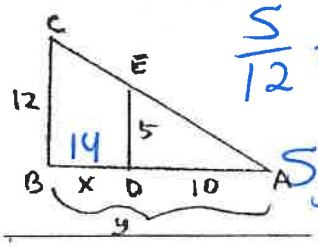


$\frac{x+2}{x+8} = \frac{x}{4}$

$4x + 8 = x^2 + 8x$

15. Solve for the missing variables.

$\Delta ABC \sim \Delta ADE$

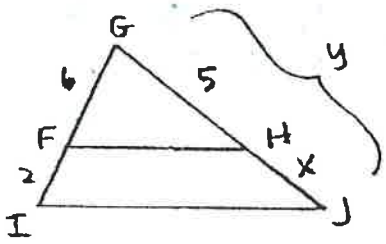


$\frac{5}{12} = \frac{10}{y}$

$5y = 120$

$y = 24$

$\Delta FGH \sim \Delta IGJ$

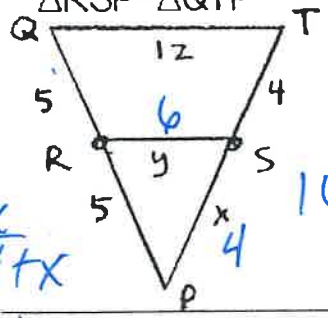


$\frac{6}{8} = \frac{5}{y}$

$6y = 40$

$y = 6.7$ $x = 1.7$

$\Delta RSP \sim \Delta QTP$



$\frac{5}{10} = \frac{y}{12}$

$10y = 60$

$y = 6$

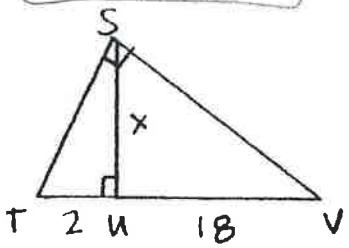
$\frac{5}{10} = \frac{x}{4+x}$

$10x = 20 + 5x$

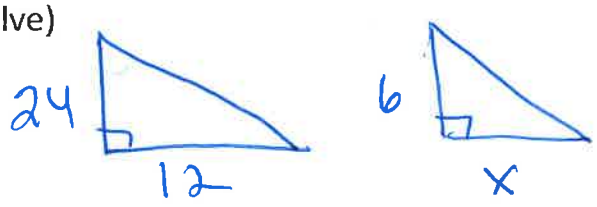
$5x = 20$

$x = 4$

$\Delta STU \sim \Delta VSU$



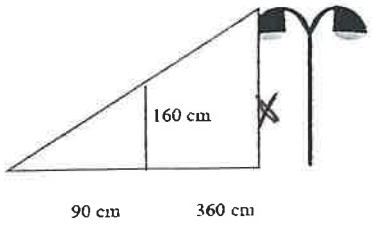
16. A tree 24 feet tall casts a shadow 12 feet long. Brad is 6 feet tall. How long is Brad's shadow? (draw a diagram and solve)



$\frac{24}{6} = \frac{12}{x}$

$24x = 72$ $x = 3$

17. A girl 160 cm tall, stands 360 cm from a lamp post at night. Her shadow from the light is 90 cm long. How high is the lamp post?



$\frac{90}{450} = \frac{160}{x}$

$90x = 72{,}000$

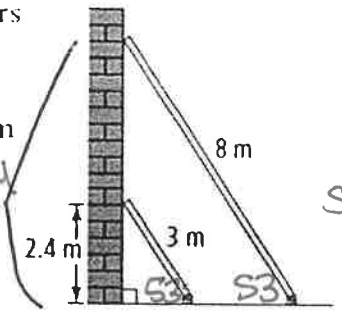
$x = 800$ cm

18. The perimeter of ΔMDF is 84 feet. If $\Delta MDF \sim \Delta KNG$ and the scale factor of ΔMDF to ΔKNG is $\frac{3}{4}$, find the perimeter of ΔKNG.

$\frac{MDF}{KNG}$

$\frac{3}{4} \cdot 84 = 63$ 112

19. Two extension ladders are leaning at the same angle against a vertical wall. The 3-m ladder reaches 2.4 m up the wall. How much farther up the wall does the 8-m ladder reach?

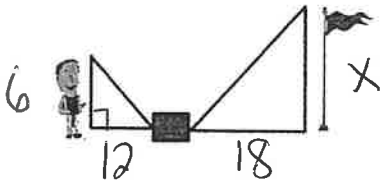


$\sin S3 = \frac{x}{8}$

$\sin^{-1} = \frac{2.4}{3}$

6.4
-2.4
4.0

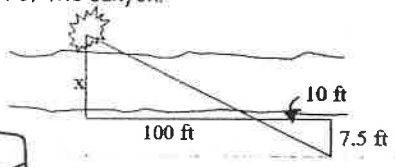
20. Tony who is 6 ft tall is looking at a mirror on the ground 12 feet in front of him and he can see the top of the flag pole. He knows the distance from the mirror to the flag pole is 18 ft and that the 2 triangles are similar. How tall is the flag pole?



$\frac{6}{18} = \frac{12}{x}$

$x = 36$

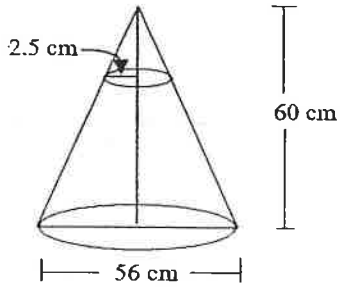
21. A bush is sighted on the other side of a canyon. Find the width of the canyon.



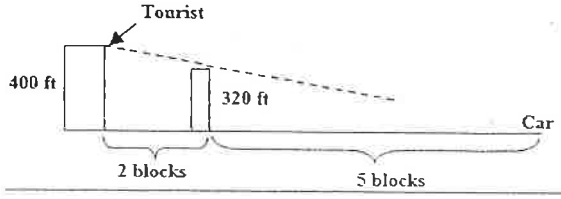
$\frac{x}{7.5} = \frac{100}{10}$

$x = 75$

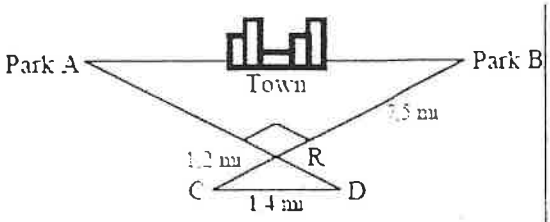
22. The cheerleaders at City High make their own megaphones by cutting off the small end of a cone made from heavy paper. If the small end of the megaphone is to have a radius of 2.5 cm, what should be the height of the cone that is cut off?



23. A tourist on the observation deck of a building looks east, facing another building 320 ft high and two blocks from the first building. Her view is 400 ft above street level. Her car is parked five blocks east of the second building. If no other buildings intervene, can she see her car?



24. Mason Construction wants to connect two parks on opposite sides of town with a road. Surveyors have laid out a map as shown. The road can be built through the town or around town through point R. The roads intersect at a right angle at point R. The line joining Park A to Park B is parallel to the line joining C and D.



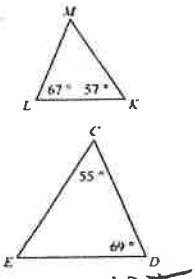
Note: The figure is not drawn to scale.

a. What is the distance between the parks through town?

b. What is the distance from Park A to Park B through point R?

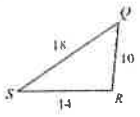
25 **State if the triangles in each pair are similar. If so, state how you know they are similar and complete the similarity statement. If not, state why.**

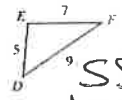
1)



$\triangle CDE \sim$ NOT

2)



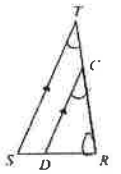


SSS

$\triangle QRS \sim \triangle DEF$

$\frac{18}{9} = \frac{14}{7} = \frac{10}{5}$

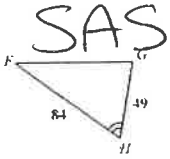
3)



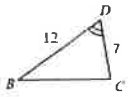
AA

$\triangle RST \sim \triangle RDC$

4)



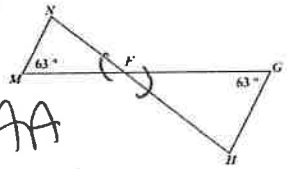
SAS



$\triangle HGF \sim \triangle DCB$

$\frac{49}{7} = \frac{84}{12}$

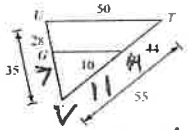
5)



AA

$\triangle FGH \sim \triangle FMN$

6)

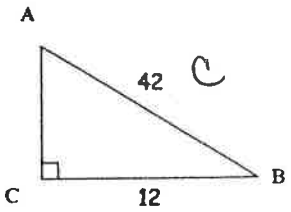


$\triangle VUT \sim \triangle VGH$

$\frac{7}{35} = \frac{11}{55}$

SAS

26. Using the diagram below, solve the right triangle. Round angle measures to the *nearest degree* and segment lengths to the *nearest tenth*.



a

$\sin^{-1} A = \frac{12}{42}$ $m\angle A \sim 17°$ $a \sim 12$

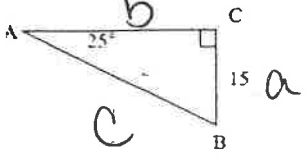
$\cos^{-1} B = \frac{12}{42}$ $m\angle B \sim 73°$ $b \sim 40.2$

$m\angle C \sim 90°$ $c \sim 42$

$12^2 + b^2 = 42^2$

$\cos^{-1} B = \frac{12}{42}$ $\sin^{-1} A = \frac{12}{42}$

27 Using the diagram below, solve the right triangle. Round angle measures to the *nearest degree* and segment lengths to the *nearest tenth*.



$m\angle A \sim 25°$ $a \sim 15$

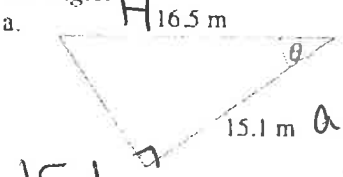
$m\angle B \sim 65°$ $b \sim 32.2$

$m\angle C \sim 90°$ $c \sim 35.5$

$\sin 25 = \frac{15}{c}$ $\tan 25 = \frac{15}{b}$

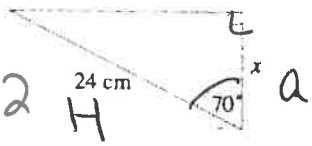
28. Find the missing side or angle. Round sides to the nearest *tenth* and angle to the nearest *angle*.

a.



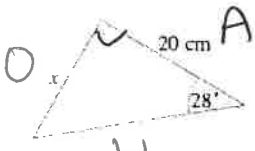
$\cos^{-1} x = \frac{15.1}{16.5}$ 28°

b.



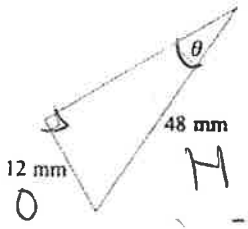
$\cos 70 = \frac{x}{24}$

c.



$\tan 28 = \frac{x}{20}$ 10.7

d.



$\sin^{-1} x = \frac{12}{48}$ 14°

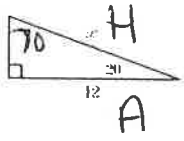
29. A 30-foot steel girder is leaning against a wall. The foot of the girder is 20 feet from the wall. Find to the ***nearest degree*** the angle which the girder makes with the ground.

30. An airplane A is 1000 feet above the ground and directly over a church C. The angle of elevation of the plane as seen by a boy at a point A on the ground some distance from the church is 22 degrees.

a. How far, to the *nearest foot*, is the boy is from the church?

b. How far, to the *nearest foot*, is the boy from the plane?

31. Which equation can be used to find the value of x in the right triangle shown?



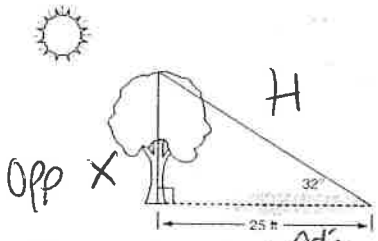
A. $\cos 20° = \frac{x}{12}$

B. $\sin 20° = \frac{12}{x}$

C. $\cos 20° = \frac{12}{x}$

D. $\cos 70° = \frac{x}{12}$

32. A tree casts a 25-foot shadow on a sunny day, as shown in the diagram below.



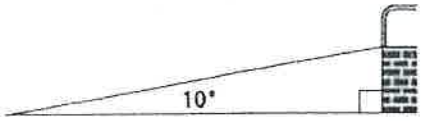
If the angle of elevation from the tip of the shadow to the top of the tree is 32°, what is the height of the tree to the *nearest tenth of a foot*?

$\tan 32 = \frac{x}{25}$ 15.6

33. A base angle of an isosceles triangle measures 30°, and the length of one of the legs is 12. What is the length of the altitude drawn to the base of the triangle?

A. $6\sqrt{3}$ B. 12 C. 6 D. 9

34. A ramp to a loading dock must slant at a 10° angle.



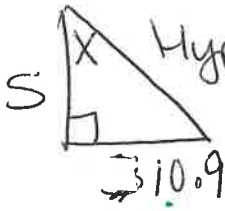
a. If the ramp meets the ground 25 feet from the base of the building, how long is the ramp?

b. Construction workers are building a different ramp up to a door that is 2 feet off the ground. Find the length of the ramp.

$5^2 + b^2 = 12^2$

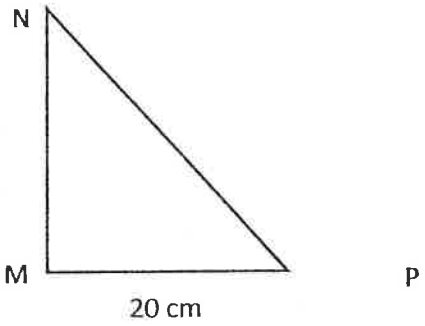
35. If $\cos x = \frac{5}{12}$, then what is the value of tan x?

$\cos x = \frac{opp}{hyp}$



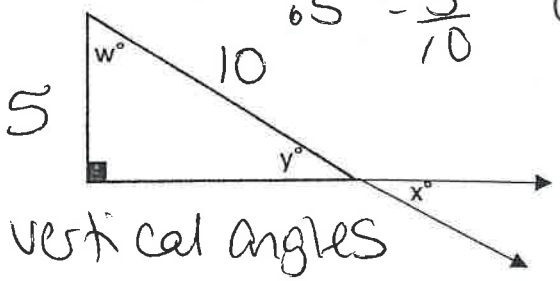
$\tan x = \frac{10.9}{5}$

36. In the figure shown, cos P= .50. What is the length of PN?



37. In the figure shown, cos (w°) = 0.50. What is sin (x°)?

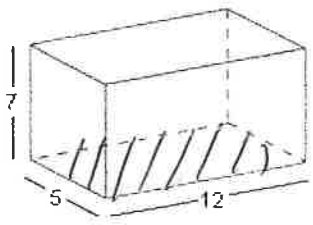
$\cos 65 = \frac{5}{10}$ $\cos = \frac{adj}{hyp}$



$\sin x = \frac{5}{10}$

x and y: vertical angles

38. Find the Volume and Surface area of the prism.



$P = 12+5+12+5 = 34$

$B = 5(12) = 60$

$h = 7$ $SA = Ph + 2B$ $V = Bh$ $60(7)$

358 ← $34(7)+2(60)$ 420

39. Given a cylinder with a radius of 5 and a height of 7, find the Volume and Surface area.

$r = 5$ $SA = 2\pi rh + 2\pi r^2 = 2\pi 5(7) + 2\pi 5^2$

$h = 7$ $V = \pi r^2 h = \pi 5^2(7) = 175\pi$ 120π

40. Find the total Surface area of a cone with radius 3, slant height of 5.

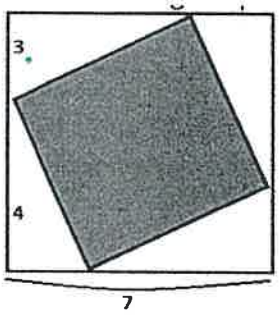
$r=3$ $\quad SA = \pi r l + \pi r^2$

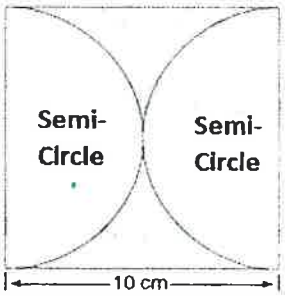
$l=5$ $\quad 2\pi 3(5) + \pi 3^2 = \boxed{24\pi}$

41. Find the volume of the cone in Question 40.

$V = \frac{\pi r^2 h}{3}$ $\quad \frac{\pi 3^2(\ )}{3}$

42. Find the area of the shaded areas.





$\frac{1}{3} + \frac{1}{2}$

3 | 3 — 1
3 | 9
3 | 27
3 | 81

$\frac{4}{6} \cdot \frac{4}{6} \cdot \frac{4}{6} = \frac{64}{216}$

43. Simplify the following expressions. Write all answers with positive exponents.

A. $(-3y^{1/3})(-2y^{1/2})$ $\quad +6y^{\frac{5}{6}}$

C. $\sqrt[4]{81x^5y^2z^8}$ $\quad 3x^{\frac{5}{4}}y^{\frac{1}{2}}2$

B. $\sqrt[3]{xy^2}$ $\quad x^{\frac{1}{3}}y^{\frac{2}{3}}$

D. $((\sqrt[3]{x^2})(\sqrt[6]{x^4}))^{-3}$ $\quad x^{\frac{10}{27}}$

$\frac{x^{\frac{2}{3}}}{\left(x^{\frac{4}{6}}\right)^3} \rightarrow \frac{x^{\frac{2}{3}}}{x^{\frac{8}{27}}}$

44. Write an equivalent function for the following.

A. $F(x) = (4^{-2x})(4^x)$ _____

B. $F(x) = \frac{81}{9^{2x-3}}$ _____

45. Solve the following equations.

A. $6^{-2a} = 6^{2-3a}$ $\quad a =$ _____

C. $3^{-2x+1} \cdot 3^{-2x-3} = 3^{-x}$ $\quad x =$ _____

B. $5^{3x} = \frac{1}{5^3}$ $\quad X =$ _____

D. $2^{7x} \cdot 8 = 2^{8x}$ $\quad x =$ _____