

Name

KEY

Algebra 1B 2nd Semester Exam Review

CHAPTER 6B

- 1) Simplify
- $(\sqrt{14} - \sqrt{22})(\sqrt{14} + \sqrt{22})$
- .

$$14 + \sqrt{308} - \sqrt{308} - 22$$

$$(-8)$$

- 2) Solve.
- $x^2 + 4 = -12$

$$\begin{array}{r} -4 \quad -4 \\ \hline \sqrt{x^2} = \sqrt{-16} \end{array}$$

$$x = \pm 4i$$

- 3) Expand and simplify
- $(2i + 3)(3i - 4)$
- .

$$\begin{array}{r} -6i^2 - 8i + 9i - 12 \\ \hline -18 + 1i \end{array}$$

- 4) What is the value of
- i
- ?

$$i = \sqrt{-1}$$

$$5) \text{ Simplify } \frac{(4+i)(5-2i)}{(5+2i)(5-2i)} = \frac{20 - 8i + 5i - 2i^2}{25 - 10i + 10i - 4i^2}$$

$$= \frac{22 - 3i}{29}$$

CHAPTER 7

6) Simplify $\left(\frac{2}{3}\right)^{-4}$ $\frac{3^4}{2^4} = \frac{81}{16}$

7) Simplify $\left(\frac{1}{p}\right)^{-1/2}$ $\cancel{X} p^{1/2}$

8) Simplify $(-2x^3y)^3$ $-2 \cdot -2 \cdot -2 = -8$

$-8x^9y^3$

9) Simplify $(4m^{-3}n^2)^{-2}$ $= \frac{m^6}{16n^4}$

10) Simplify $\frac{(x^{-4}y^3z^2)^{-2}}{(x^5y^{-4}z)^3} = \frac{x^8y^{-6}z^{-4}}{x^{15}y^{-12}z^3} = x^{-7}y^6z^{-7} = \frac{y^6}{x^7z^7}$

11) Calculate each of the following:

a. $(729)^{1/2} = \underline{27}$

→ b. $(-729)^{1/2} = \underline{\emptyset}$

c. $-729^{1/2} = \underline{-27}$

d. $(729)^{1/3} = \underline{9}$

e. $(-729)^{1/3} = \underline{-9}$

f. $-729^{1/3} = \underline{-9}$



- 12) The average pulse rate, P in beats per minute for persons t cm tall is approximated by the formula $P = 940t^{-1/2}$. Find the average pulse rate for a person who is 184 cm tall.

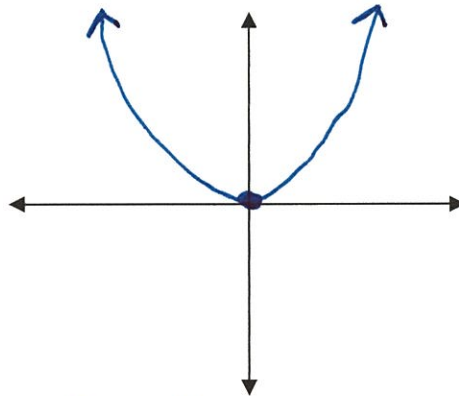
$\hookrightarrow t$

$$P = 940(184)^{-1/2}$$

$$P = 69 \text{ bpm}$$

- 13) Sketch a possible graph for the power function $y = x^n$, where n is an even whole number

even: 
odd: 



14) Simplify $\frac{(x^6 y^{-3})^{2/3}}{xy^2} = \frac{x^4 y^{-2}}{x^1 y^2} = x^3 y^{-4} = \frac{x^3}{y^4}$

- 15) Adele puts \$375 in a savings account which pays 2.45% interest, compounded semi-annually.

a. Write an equation to represent the amount in Adele's account after t years.

$$A = P \left(1 + \frac{r}{n}\right)^{n \cdot t} \rightarrow A = 375 \left(1 + \frac{0.0245}{2}\right)^{2t}$$

b. Use your equation to find the amount in the account if the money is left untouched for 8 $\rightarrow t$ years.

$$375 \left(1 + \frac{0.0245}{2}\right)^{2 \cdot 8} = \$455.65$$

CHAPTER 8

16) Simplify $\sqrt[3]{x^{12}}$

$$x^{12/3} = x^4$$

17) Rewrite using an exponent: $\sqrt[2]{x^9}$

$$\sqrt[2]{x^9} = x^{9/2}$$

18) Solve $-3\sqrt[3]{2x-5} = 9$

$$\begin{aligned} \frac{-3\sqrt[3]{2x-5}}{-3} &= \frac{9}{-3} \\ \sqrt[3]{2x-5} &= (-3)^3 \\ 2x-5 &= -27 \end{aligned}$$

$$\begin{aligned} 2x-5 &= -27 \\ +5 &+5 \\ \hline 2x &= -22 \end{aligned}$$

$$\frac{2x}{2} = \frac{-22}{2}$$

$$x = -11$$

19) Simplify $\sqrt{30,000p^{14}}$



30,000

30 1000

6 5

10 100

2 3

2 5

20 5

5 4

2 2

20) Simplify $\sqrt{600m^{11}}$

$$2 \cdot 5m^5 \sqrt{3 \cdot 2m}$$

$$10m^5 \sqrt{6m}$$

$$2 \cdot 5 \cdot 2 \cdot 5 p^7 \sqrt{3}$$

$$100p^7 \sqrt{3}$$

CHAPTER 9

21) Does the equation $y = 2(3)^x$ model an exponential growth or exponential decay situation? Why?

$$y = ab^x$$

growth;
b/c $3 > 1$.

- 22) A new car costing \$18,400 is predicted to depreciate at a rate of 12% per year. About how much will the car be worth in 5 years?

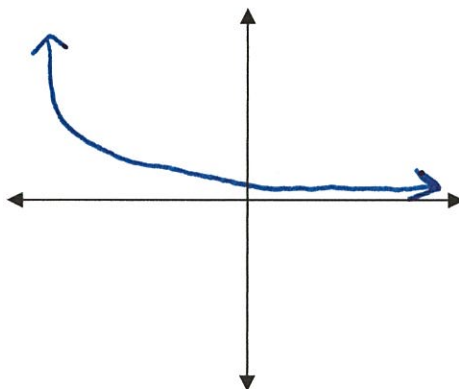
$$b = 100 - 12 = 88$$

$$y = ab^x$$

$$y = 18,400(.88)^5$$

$$y = \$9710.27$$

- 23) Sketch a graph of $y = ab^x$, where $a > 0$ and $0 \leq b \leq 1$.



- 24) The amount of a certain radioactive substance decreases continuously at a rate of .04% per year. If 5000 micrograms are left after 3200 years, how much was present initially?

$$y = Pe^{rt}$$

$$y = 5000e^{-.0004 \cdot -3200}$$

$$r = -.0004$$

- 25) Under optimal environmental conditions, a certain bacteria in a sample of milk will double every 42 minutes. A scientist is investigating a sample of 1000 bacteria.

$$\underline{\underline{b = 2}}$$

- a. Write an equation to represent the bacteria population after t minutes.

$$y = ab^x$$

$$y = 1000(2)^{t/42}$$

- b. Use your equation to find how long it will take for the bacteria population to exceed 3700.

$$\boxed{Y = 1000(2)^{(X/42)}}$$

TABLE \rightarrow Y column

26) Canada's population in 2010 was measured at 34,238,000 people. Over the past few years the population has grown at a rate of approximately 1.3%. $\rightarrow 100 + 1.3 = 101.3\%$

- a. Write a model to represent Canada's population P after t years.

$$y = ab^x$$

$$P = 34,238,000(1.013)^t$$

- b. Using your model, and assuming the growth rate remains the same, what will the population be in the year 2022? $t = 12$

$$P = 34,238,000(1.013)^{12}$$

$$P = 39,978,062 \text{ people}$$

- c. Again, assuming the growth rate has remained the same, what was the population in the year 1992? $t = -18$

$$P = 34,238,000(1.013)^{-18}$$

$$P = 27,135,534 \text{ people}$$

CHAPTER 10

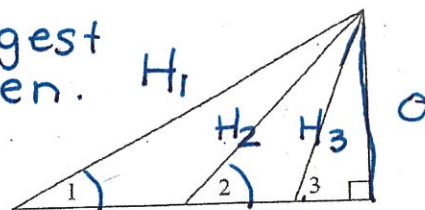
- 27) In the figure at the right, which angle has the smallest sine?

~~$\angle A$~~

$\angle 1: \frac{O}{H_1}$ $\angle 2: \frac{O}{H_2}$

$\angle 3: \frac{O}{H_3}$

\rightarrow biggest den.



- 28) Give the exact values for the trigonometric ratios below.

a. $\sin 30^\circ = \frac{1}{2}$

b. $\cos 30^\circ = \frac{\sqrt{3}}{2}$

c. $\tan 30^\circ = \frac{\sqrt{3}}{3}$

d. $\sin 45^\circ = \frac{\sqrt{2}}{2}$

e. $\cos 45^\circ = \frac{\sqrt{2}}{2}$

f. $\tan 45^\circ = 1$

g. $\sin 60^\circ = \frac{\sqrt{3}}{2}$

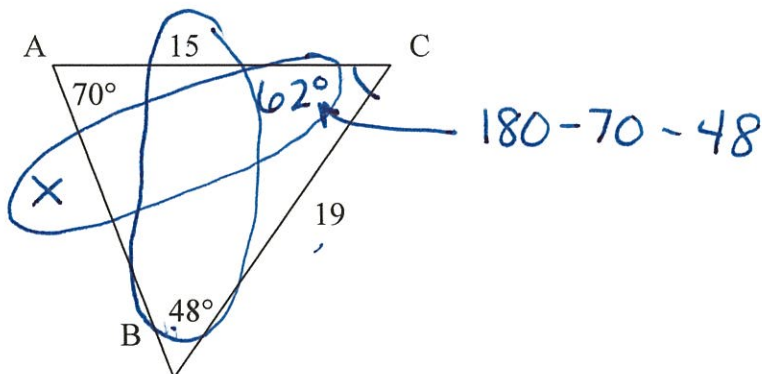
h. $\cos 60^\circ = \frac{1}{2}$

i. $\tan 60^\circ = \sqrt{3}$

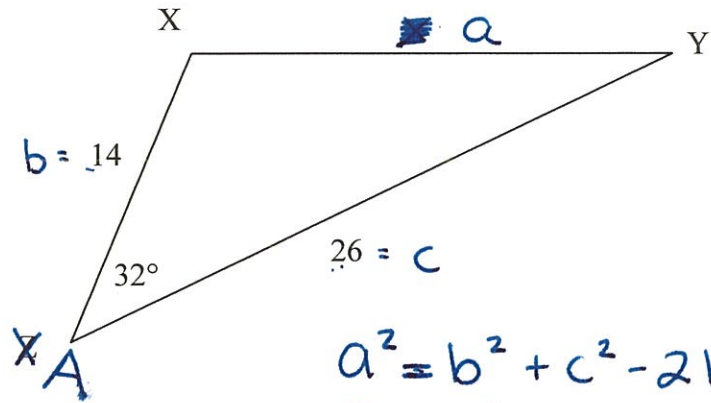
- 29) Find the length of side AB.

$\frac{\sin 62^\circ}{X} = \frac{\sin 48^\circ}{15}$

$X = 17.8$



30) Find the length of side XY.

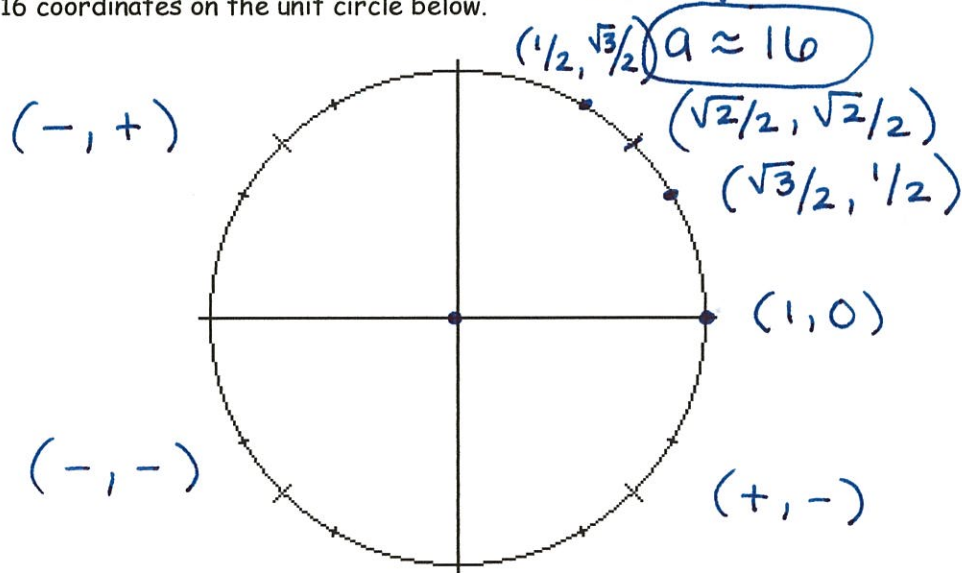


$$a^2 = b^2 + c^2 - 2bc \cos A$$

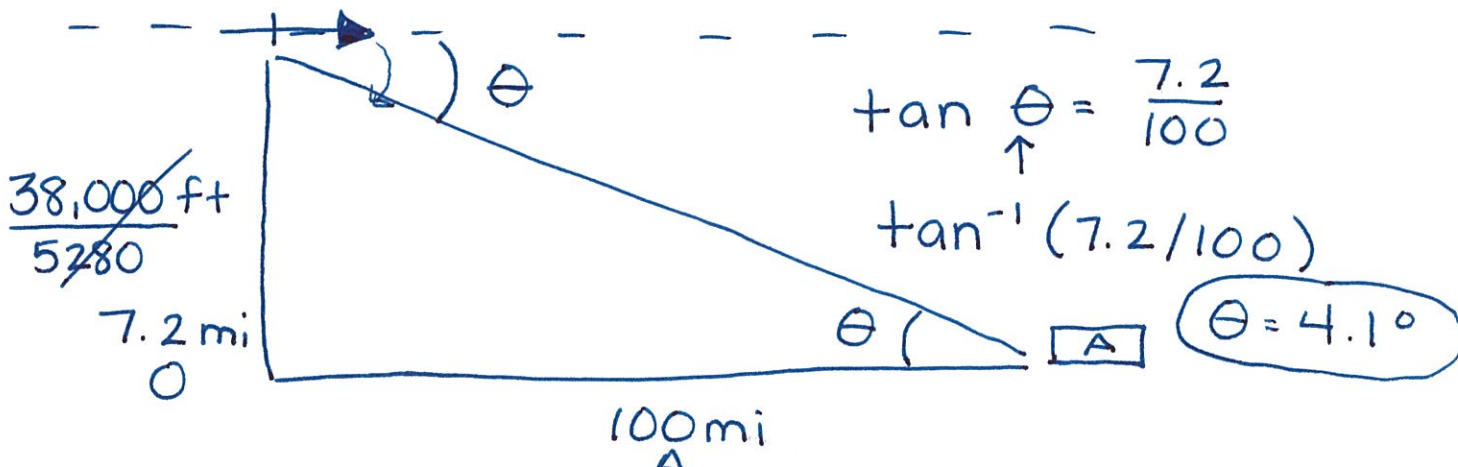
$$a^2 = 14^2 + 26^2 - 2 \cdot 14 \cdot 26 \cdot \cos 32^\circ$$

$$\sqrt{a^2} = \sqrt{254.6}$$

31) Label all 16 coordinates on the unit circle below.



32) An airplane pilot cruising at 38,000 feet receives instructions from air traffic control directing him to begin his descent when he is 100 miles from the airport. The pilot knows that in order to have a smooth descent, he must not descend at an angle greater than 5° . Will air traffic control's directions allow for a smooth, non-turbulent landing? Explain.



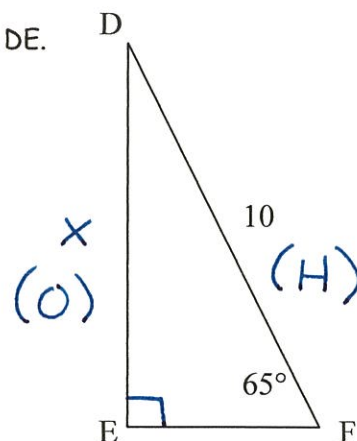
33) Use the right triangle at the right to determine the length of side DE.

$$\sin 65 = \frac{x}{10}$$

$$\underline{.9063} = \frac{x}{10}$$

$$1$$

$$\underline{9.1 = x}$$



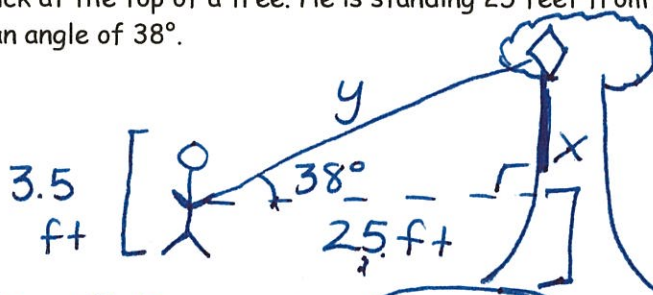
34) A 3.5-foot-tall boy gets his kite stuck at the top of a tree. He is standing 25 feet from the base of the tree. He can see his kite at an angle of 38°.

a. How tall is the tree?

$$\tan 38 = \frac{x}{25}$$

$$\underline{0.7813} = \frac{x}{25}$$

$$1$$



$$x = 19.5 + 3.5 = \underline{23 \text{ ft}}$$

b. How long is the string leading from the boy's hand to the kite?

$$\cos 38 = \frac{25}{y}$$

$$\underline{0.7880} = \frac{25}{y}$$

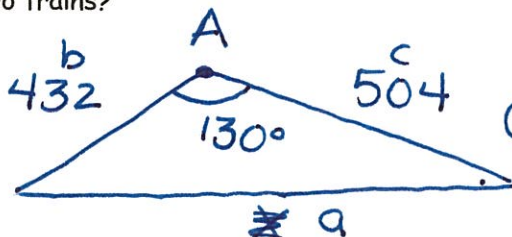
$$1$$

$$y$$

$$\cancel{.7880} y = \frac{25}{\cancel{.7880}}$$

$$y = \underline{31.7 \text{ ft}}$$

35) Two trains depart from a common station. The tracks they are traveling on form a 130° angle. One train travels at a speed of 72 mph, while the other travels at a rate of 84 mph. After six hours, how far apart are the two trains?



$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$a^2 = 432^2 + 504^2 - 2 \cdot 432 \cdot 504 \cdot \cos 130$$

$$\sqrt{a^2} = \sqrt{720,546}$$

$$\underline{a = 848 \text{ mi}}$$

CHAPTER 11

36) Factor the expression completely: $36x^5y^8 + 60x^9y^5 + 84x^{10}y^7$

$$12x^5y^5 (3y^3 + 5x^4 + 7x^5y^2)$$

37) Factor the expression completely: $5m^3 + 25m^2 - 30m$

$$5m(m^2 + 5m - 6)$$

$$5m(m + 6)(m - 1)$$

$\begin{array}{r} 1, 6 \\ -2, 3 \end{array}$

38) Factor the expression completely: $144c^2 - 25$

$$(12c + 5)(12c - 5)$$

$$(12c + 5)(12c - 5)$$

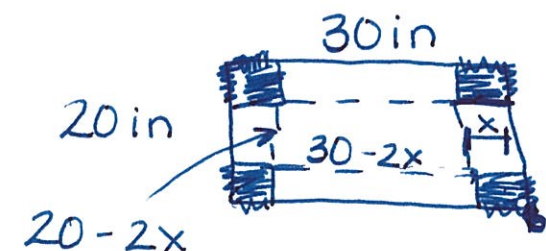
39) Given the polynomial $\frac{3c^4}{\uparrow} - 4c^2 + 5$, state the following:

Degree: 4

Number of Terms: 3

Leading Coefficient: 3

40) A box is folded from a sheet of cardboard 20 in by 30 in by cutting squares of side length x from each corner. Write a simplified expression for the volume of this box.



$$V = l \cdot w \cdot h$$

$$V = (30 - 2x)(20 - 2x)(x)$$

$$V = (600 - 60x - 40x + 4x^2)(x)$$

$$V = (600 - 100x + 4x^2)(x)$$

$$V = 600x - 100x^2 + 4x^3$$