SM3

Name_____

Review/Notes 'B

Date_____ Period____

Perform the indicated operation.

1) $g(x) = 2x + 4$
$h(x) = 3x^2 + 3x$
Find $g(h(x))$

$g(3x^2+3x)$
$= 2(3x^2+3x)+4$
$6x^2+6x+4$

2) Find the inverse of each function.

$f(x) = (x-2)^3$

$y = (x-2)^3$
$x = (y-2)^3$
$\sqrt[3]{x} = y-2$
$y = \sqrt[3]{x}+2$

Simplify.

3) $5\sqrt[4]{405a^4b}$

$5\sqrt[4]{5\cdot3\cdot3\cdot3\cdot3a^4b}$
$15a\sqrt[4]{5b}$

4) $-\sqrt{72}+3\sqrt{2}+3\sqrt{8}$

$-6\sqrt{2}+3\sqrt{2}+6\sqrt{2}$
$= 3\sqrt{2}$

5) $\dfrac{2}{3+\sqrt{3}}$

$\dfrac{(3-\sqrt{3})}{(3-\sqrt{3})} = \dfrac{6-2\sqrt{3}}{9-3} = \dfrac{3-\sqrt{3}}{3}$

6) $(3+\sqrt{5})(5+\sqrt{5})$

$15+3\sqrt{5}+5\sqrt{5}+5$
$20+8\sqrt{5}$

Change each expression to exponential or radical form.

7) $(\sqrt[3]{7a})^5$

$(7a)^{5/3}$

8) $(3x)^{\frac{4}{5}}$

$\sqrt[5]{(3x)^4}$

Solve each equation. Remember to check for extraneous solutions.

9) $-6(3-3x)^{\frac{1}{2}} = -18$

$(3-3x)^{\frac{1}{2}} = 3$
$3-3x = 9$
$-3x = 6$
$x = -2$

Chapter 6

Rewrite each equation to exponential form or logarithmic form.

10) $8^2 = 64$

$\log_8 64 = 2$

11) $\log_{\frac{1}{2}} \dfrac{1}{32} = 5$

$\left(\frac{1}{2}\right)^5 = \frac{1}{32}$

Expand or condense each logarithm

12) $\log\left(\dfrac{a}{b^2}\right)^5$

$5\log\frac{a}{b^2}$
$= 5[\log a - \log b^2) = 5\log a - 10\log b$

13) $6\ln u - 18\ln v$

$\ln u^6 - \ln v^{18}$
$= \ln\frac{u^6}{v^{18}}$

14) Evaluate the expression.

$\log_2 \dfrac{1}{32} = y$

$2^y = \frac{1}{32}$
$y = -5$

15) Solve the inequality.

$\log_3 x + 2 \le 4$

$\log_3 x \le 2$
$x \le 3^2$
$x \le 9$
and $x > 0$
$0 < x \le 9$

Solve: Round your answers to the nearest tenth.

16) $18^x = 73.8$

$x = \log_{18} 73.8 = \dfrac{\log 73.8}{\log 18}$
$x \approx 1.49$

17) $\log_4 38$

$= \dfrac{\log 38}{\log 4} \approx 2.62$

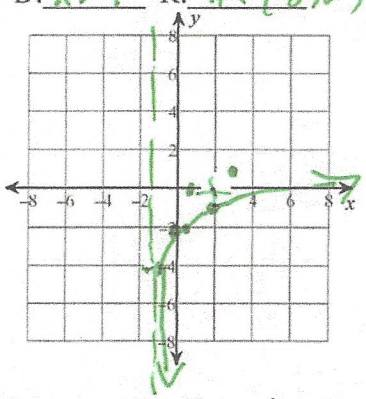
Graph each function with the vertical asymptote. State the domain, and range.

18) $y = \log_3(x+1) - 2$

D: $x > -1$ R: $\mathbb{R}$ $(-8, \infty)$ $y = \log_3 x$ ← 1 ↓ 2

$3^y = x$

x	y
$\frac{1}{3}$	−1
1	0
3	1



Use the formula $f(t) = ae^{kt}$ to solve each of the following.

19) A particular compound decays according to the equation $y = ae^{-0.0576t}$ where t is in days. Find the half-life of the compound.

$\frac{1}{2} = e^{-.0576t}$ $\ln\left(\frac{1}{2}\right) = -.0576t$ $t \approx 12$ days

Simplify the quotient.

20) $\dfrac{n^2 - 4n - 140}{10n - 140} \div \dfrac{n^2 + 12n + 20}{n^2 - 7n - 18} = \dfrac{n-9}{10}$

$\dfrac{(n-14)(n+10)}{10(n-14)} \cdot \dfrac{(n-9)(n+2)}{(n+10)(n+2)}$

21) Simplify the sum.

$\dfrac{5}{y^2 - 9} + \dfrac{2y}{y+3}$

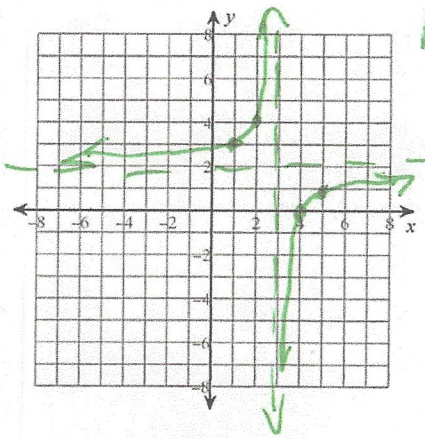
$\dfrac{5}{(y+3)(y-3)} + \dfrac{2(y-3)}{(y+3)(y-3)}$ $\dfrac{5 + 2y - 6}{(y+3)(y-3)} = \dfrac{2y-1}{y^2-9}$

Solve the equation. Remember to check for extraneous solutions.

22) $\dfrac{5}{3p} + \dfrac{2}{3} = \dfrac{1}{3p}$ $3p$ $5 + 2p = 1$ $2p = -4$ $p = -2$

Identify the vertical asymptotes, horizontal asymptote, domain, and range of each. Then sketch the graph.

23) $f(x) = -\dfrac{2}{x-3} + 2$ V.A. $x = 3$ H.A $y = 2$



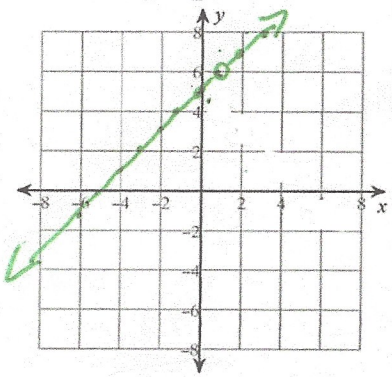
x	y
1	3
2	4
4	0
5	1

D: $x \neq 3$

R: $y \neq 2$

24) Graph the function. Identify any asymptotes and holes.

$f(x) = \dfrac{x^2 + 4x - 5}{x - 1} = \dfrac{(x+5)(x-1)}{(x-1)}$



$y = x + 5$ with hole at $x = 1$

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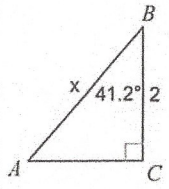
Find the measure of each side or angle. Round to the nearest tenth.

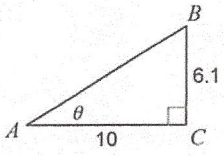
1)



$\cos 41.2 = \frac{2}{x}$

$x \approx 2.7$

2)



$\tan\theta = \frac{6.1}{10}$

$\theta \approx 31.4°$

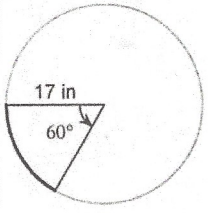
Convert each radian measure into degrees or degree to radian.

3) $\frac{17\pi}{12} \cdot \frac{180}{\pi} = 255°$

4) $70° \cdot \frac{\pi}{180} = \frac{7\pi}{18}$

Find the length of each arc.

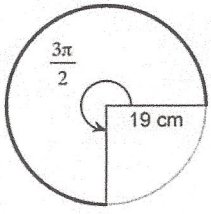
5)



$60 = \frac{\pi}{3}$

$\frac{\pi}{3} \cdot 17 = \frac{17\pi}{3}$ in

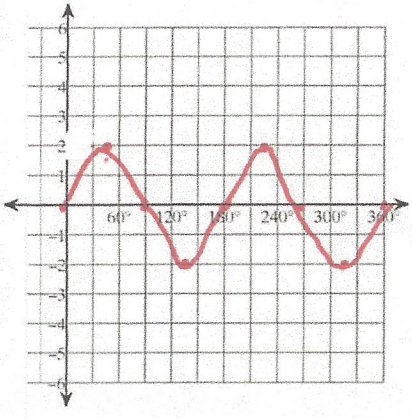
6)



$\frac{3\pi}{2} \cdot 19 = \frac{57\pi}{2}$ cm

Graph each function using degrees or radians.
Identify the period, amplitude, phase shift, vertical shift, domain and range.

7) $y = 2\sin 2\theta$



$a = 2$

$p = \frac{2\pi}{2} = \pi = 180°$ $\frac{180}{4} = 45°$

p.s. none

v.s. none

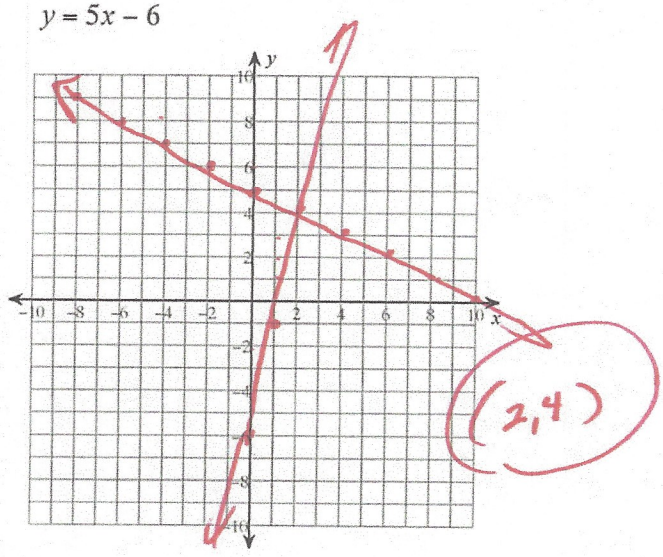
D: $\mathbb{R}$

R: $[-2, 2]$

Solve each system by graphing.

8) $y = -\frac{1}{2}x + 5$

$y = 5x - 6$



(2,4)

9) Solve each system by substitution.

$2x + y = 1$

$-6x - 4y = 0$

$y = -2x + 1$

$-6x - 4(-2x+1) = 0$

$-6x + 8x - 4 = 0$

$2x = 4$

$x = 2$

$y = -2(2) + 1$

$y = -3$

(2, -3)

Solve each system by elimination.

10) $4x - 9y = -5$

$5x + 4y = 9$

$16x - 36y = -20$

$45x + 36y = 81$

$61x = 61$

$x = 1$

$5 + 4y = 9$

$4y = 4$ $y = 1$

(1,1)

11) Solve each system using any method:

$x^2 - y = 5$

$y = x + 1$

$x^2 - (x+1) = 5$

$x^2 - x - 6 = 0$

$(x-3)(x+2) = 0$

$x = 3$ $x = -2$

(3,4)

(-2, -1)

12) New York City is a popular field trip destination. This year the senior class at High School A and the senior class at High School B both planned trips there. The senior class at High School A rented and filled 8 vans and 5 buses with 313 students. High School B rented and filled 5 vans and 6 buses with 325 students. Every van had the same number of students in it as did the buses. How many students can a van carry? How many students can a bus carry?

11 vans

45 buses

$(8v + 5b = 313)\ 5$

$(5v + 6b = 325)\ -8$

$40v + 25b = 1565$

$-40v - 48b = -2600$

$8v + 225 = 313$

$v = 11$

$-23b = -1035$

$b = 45$

13) The perimeter of the rectangle is 20 cm. The difference in the length and width is 4cm. Find the dimensions of the rectangle?

$2(l + w) = 20$

$l - w = 4$

$l + w = 10$

$l - w = 4$

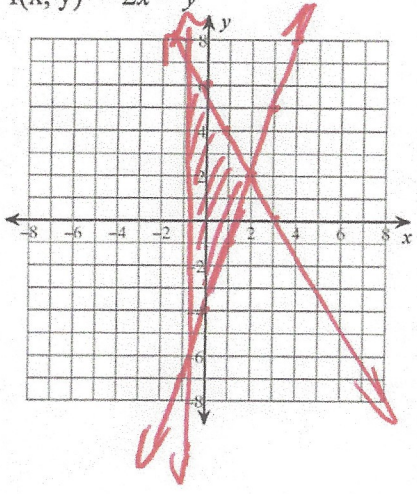
$2l = 14$

$l = 7$

$w = 3$

Graph each system of inequalities. Name the coordinates of the vertices of the feasible region. Find the maximum and minimum values of the given function for this region. (6 points each)

14) $y \geq 3x - 4$
$2x + y \leq 6$
$x \geq -1$
$f(x, y) = 2x - y$



(-1, 8) (2(-1) - 8) = -10 min
(2, 2) (2(2) - 2) = 2
(-1, -7) (2(-1) - -7) = 5 max

Draw a box-and-whisker plot for each data set.

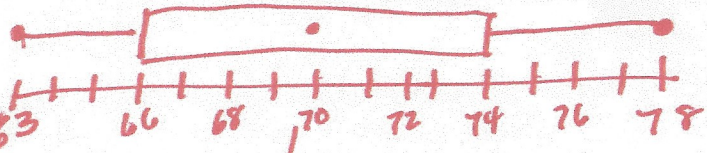
15) Mens Heights (Inches)

~~65~~ ~~77~~ ~~74~~ ~~68~~ ~~71~~ ~~69~~ ~~71~~
~~69~~ ~~66~~ ~~65~~ ~~63~~ ~~73~~ ~~66~~ ~~74~~
~~78~~ ~~78~~

63, 65, 65, 66, 66, 68, 69, 69, 71, 71, 73, 74, 74, 77, 78, 78

LV(63) Q1: 66 Median: 70 Q3: 74 GV: 78

16) How many men are at least ~~75~~ 74 inches tall? 12



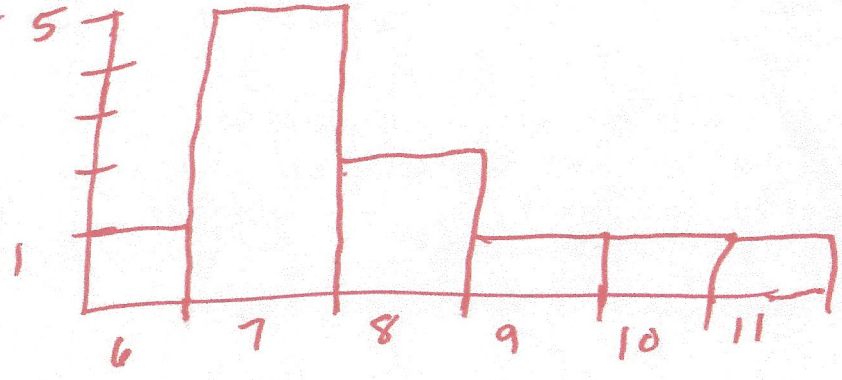
Draw a histogram for each data set. Find the mean, median and mode.

17) Shoe Size

~~7.5~~ ~~8.5~~ ~~6.5~~ ~~8~~ 11 10
~~7.5~~ ~~7~~ ~~7.5~~ 9 ~~7.5~~ 5

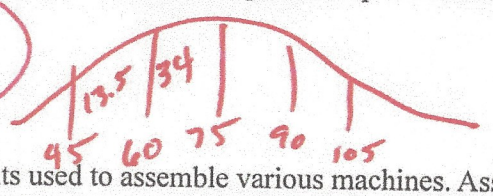
6.5, 7, 7.5, 7.5, 7.5, 7.5, 8, 8.5, 9, 10, 11

8.18 mean
7.5 mode
7.5 mode



18) A grading scale is set up for 1000 students' test scores. It is assumed that the scores are normally distributed with a mean score of 75 and a standard deviation of 15
a) What percent of students will have scores between 45 and 75? 47.5%.
b) If 60 is the lowest passing score, how many students are expected to pass the test?

.84(1000) = 840



19) A hardware manufacturer produces 50 bolts used to assemble various machines. Assume that the diameter of bolts produced by this manufacturer has a mean of 5.11 mm and the standard deviation is 0.1 mm.
Calculate the margin of error and a 95% confidence interval.

$5.082 \le \mu \le 5.138$ $\quad 5.11 \pm 1.96\left(\frac{0.1}{\sqrt{50}}\right) \approx 0.028$

20) An Ivy league school will only admit students who place at least 2 z-scores above the mean on the ACT that has a mean of 18 and a standard deviation of 6. What is the minimum score that an applicant must obtain to be admitted?

18 + 12 = 30

21) A patient recently diagnosed with Alzheimer's disease takes a cognitive abilities test and scores a 45. The mean on this test is 52 and the standard deviation is 5. What is the patient's percentile rank?

$\frac{45-52}{5} = -1.4$ $\quad$ 8.1%

Chapter 9

Find the nth term of an arithmetic sequence with

22) $a_5 = 17$ and $a_9 = 33$ $\quad \frac{33-17}{9-5} = \frac{16}{4} = 4$

$17 = a_1 + 4(4)$
$a_1 = 1$
$a_n = 1 + 4(n-1)$

23) Find S_n for the arithmetic series in which

$27 + 34 + 41 + 48\ldots,\ n = 16$ $\quad 27 + 15(7) = 132$

$16\left(\frac{27+132}{2}\right) = 1272$

Find the sum of the arithmetic series.

24) $\sum_{m=1}^{12} (2m - 1)$

$12\left(\frac{1+23}{2}\right) = 144$

25) Find the sum of the geometric series.

$\sum_{n=1}^{7} -2 \cdot 3^{n-1}$

$-2\left(\frac{1-3^7}{1-3}\right) = -2186$

Given two terms in a geometric sequence find the common ratio, the nth term and then find the 8th term.

26) $a_2 = 6$ and $a_5 = 162$

$r^3 = 27$
$r = 3$
$a_n = 2(3)^{n-1}$
$a_8 = 2(3)^7 = 4374$