TEST SET 12- ANSWER KEYS AND SCORE CONVERSION TABLE

	1	2	3	4	5	6	7	8	9	10	11
Module 1	B	3/16	2	73	A	D	C	B	C	B	B
	12	13	14	15	16	17	18	19	20	21	22
	C	B	A	D	4	A	D	B	5	D	A
	1	2	3	4	5	6	7	8	9	10	11
Module 2	B	1/8	49	B	A	1	C	C	C	A	D
	12	13	14	15	16	17	18	19	20	21	22
	C	D	C	B	B	D	C	D	A	A	B

MATH SCORE COVERSION TABLE (SCALED SCORES: 200-800)

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
44	800	33	680	22	530	11	350
43	800	32	660	21	520	10	320
42	800	31	650	20	500	9	300
41	800	30	630	19	480	8	270
40	790	29	620	18	460	7	260
39	780	28	610	17	450	6	260
38	770	27	600	16	430	5	260
37	750	26	590	15	420	4	250
36	730	25	570	14	410	3	230
35	710	24	560	13	390	2	210
34	690	23	550	12	370	1	200

*RAW SCORE = The total number of problems correct on both module 1 (0-22) and module 2 (0-22).

Answers and explanations for Test 12 (Module 1)

1. B)

   If the graph is translated 3 units right, plug $(x - 3)$ into x in the equation. Therefore, $(x - 3 + 1)^2 + (y - 2)^2 = 64$. It becomes $(x - 2)^2 + (y - 2)^2 = 64$.

2. $\frac{3}{16}$

   The number of total outcomes based on the condition (the number of customers who did gambling) is 800. And the number of favorite outcomes (the number of customers who didn't visit buffet restaurant and did gambling) is 150. Therefore, the probability $= \frac{150}{800} = \frac{3}{16}$.

3. 2

   The volume of the new cylinder after attached is $\pi \cdot 2^2 \cdot 2h = k\pi$. So, $k = 8h$. The surface area of one cylinder before attached is $2 \cdot (\pi 2^2) + 2\pi(2)(h) = k\pi$. So, $k = 8 + 4h$. Now, set two equations for k equal to each other. $8h = 8 + 4h$. Therefore, $h = 2$.

4. 73

   Set up an equation for the expression. $540 = \left(1 - \frac{k}{100}\right) \cdot 2{,}000$. Now, solve for k. $\frac{540}{2{,}000} = 1 - \frac{k}{100}$. And $\frac{k}{100} = 1 - \frac{540}{2{,}000}$. Thus, $k = 100\left(1 - \frac{540}{2{,}000}\right) = 73$.

5. A)

   The length of an arc ACB is $2\pi(r) \cdot \frac{45}{360} = 3\pi$. Solve for r. $r = 12$. The area of larger sector ADB is $\pi(12)^2 \cdot \frac{315}{360} = 126\pi$.

6. D)

   Based on the equation given, we know that the hourly charge for the plumber is $92. Since the customer B's job took 3 hours longer than the customer A's job. $3 \times 92 = \$276$ will be charged more on the customer B.

7. C)

   Factor the right side of the equation. $4x^2 - 5x - 6 = (x + 2)(4x - 3)$. Now, compare this to the left side of the given equation. Then you get $a = 2 \ and \ b = 4$. Thus, $ab = (2)(4) = 8$.

8. B)

   The system of three equations will have solutions at the intersection of all curves at the same time. Therefore, we can find only one intersection of three curves based on the given graph.

9. C)

   The fastest way to get the answer is to choose a point in the region and plug that into both inequalities to check if that works. For example, (3,0) in region C works for both inequalities. Therefore, the solution to the system of inequalities must be region C.

10. B)

    The process of elimination. Use the numbers in the answer choices. For example, Plug in $x = \frac{4}{9}$. $then,$ $the \ equation \ doesn't work \ because \ \frac{\sqrt{11}}{3} \neq -\frac{4}{3}$. Plug in $x = -\frac{4}{9}$. Then, $\frac{4}{3} = -3 \cdot \left(-\frac{4}{9}\right)$. It works.

11. B)

    Plug in the values in the table to eliminate the wrong answers. Use (10, 18.30) into the answer choices. Then, only B) $y = 1.23x + 6$ works.

12. C)

Set up an equation for the new mean of 33 students. $\frac{85\times36-3\cdot x}{33} = 87$, where x is the mean score for three students who dropped the course. Solve for x. then, $x = 63$.

13. B)

Set up an equation for the percent increase. $180 \cdot (1 + 0.15)^3 = 180k$. Therefore, $k = (1 + 0.15)^3 \approx 1.52$.

14. A)

The area of kite is $\frac{1}{2}(diagonal1)(diagonal2)$. Since the diagonal CD bisects the diagonal AB from the property of kite, we know that $AB = 2AE = 2(4) = 8$. Therefore, the area of kite $= \frac{1}{2}(8)(7) = 28$.

15. D)

The mean of 22 fire fighters $= \frac{2\times3+4\times4+6\times6+8\times5+10\times4}{22} = 6.27$. The mean with a new fire fighter $=$ $\frac{2\times3+4\times4+6\times6+8\times5+10\times4+6}{23} = 6.26$. so, the mean will decrease. The median of 22 fire fighters is 6 and the median of 23 fire fighters is also 6. Therefore, the median remains the same.

16. 4

Expand the expression $(x - 2)^2 + m = x^2 - 4x + 4 + m$. Compare this to $x^2 + kx + 20$. Then, $k = -4\ and\ m = 16$. Therefore, $-\frac{m}{k} = -\frac{16}{-4} = 4$.

17. A)

Set y=0 on the equation and factor the right side. $0 = ax(x - 1)(x + 1)(x - 2)(x + 2)$. Using zero product property, set each factor equals to zero and solve for x. $x = 0, 1, -1, 2, -2$.

18. D)

Only information we know about the linear function is that the slope is negative. So, we don't know y values for any x values. It could be either positive, negative, or zero. II and III is false. Since the slope is negative, we know that graph is going down from left to right. Thus, $f(a) < f(b)\ if\ a > b$. I is false.

19. B)

Distance = rate x time. Thus, Rate $=\frac{Distance}{Time}$. $r_w (walking\ rate) = \frac{3x}{30}$ and $r_R (running\ rate) = \frac{x}{t}$, where t is the time, in minutes, for running. Since $r_R = 2r_W$, substitute the rates above into the equation. Then, $\frac{x}{t} = 2 \times \frac{3x}{30}$. Solve for t. $t = 5$ min. therefore, it took him a total of 35 min from home to the library.

20. 5

Count the number of dots above the line of best fit. It's because the line of best fit underestimate the heights based on shoe size. So, there are 5 points above the line.

21. D)

Set up an inequality based on the costs. $2.50n + 5.25b \le 50\ (her\ budget)$.

22. A)

To find the y-intercept, substitute x=0 into the given equation. $y = 2k \left(\frac{1}{2}\right)^1 = k$. Therefore, the coordinate of y-intercept is $(0, k)$.

1. B)

   Change $\sqrt[3]{x^8}$ into the exponential form. $x^{\frac{8}{3}}$. Now, check $(x^8)^{\frac{1}{3}} = x^{\frac{8}{3}}$. I is true. And II is false. Check $\left(x^{\frac{1}{3}}\right)^2 \cdot x^2 = x^{\frac{2}{3}} \cdot x^2 = x^{\frac{2}{3}+2} = x^{\frac{8}{3}}$. III is true.

2. $\frac{1}{8}$

   $8^x \cdot y^2 = 8^{x-1} \cdot y$. Since $x\ and\ y$ are positive numbers, divide both sides by $8^{x-1} \cdot y$.
   Then you get $8y = 1$. Therefore, $y = \frac{1}{8}$.

3. 49

   Factor the expression $9x^2 + 12xy + 4y^2 = (3x + 2y)(3x + 2y)$. Plug in the given $3x + 2y = -7$ into the expression. Then, $(-7)(-7) = 49$.

4. B)

   When the price of lunchbox is $17, the restaurant sold 145 lunchboxes. When the price of lunchbox is $12, the restaurant sold 157 lunchboxes. So, $17 \times 145 - 12 \times 157 = \$581$.

5. A)

   The planner wants to have at least 100 balloons. $r + w \geq 100$. She wants no more than twice as much red balloons as white balloons. $r \leq 2w$. Her budget is $1,000. $1.25r + 1.50w \leq 1,000$. Therefore, the answer is A)

6. 1

   To make $a + b + c$ on the right side of the equation, plug x=1 into the equation. $k(1 + 1)(1 - 1) + 3 - 2 = a + b + c$. Therefore, $a + b + c = 1$.

7. C)

   If $150 is increased 40%, it will be $150(1 + 0.40) = 210$. Now, set up an equation for interest problem. $210 = 150(1 + 0.06)^t$. use the answer choice to find the answer. So, it will take about 6 years to increase at least 40% of the deposit.

8. C)

   In the right triangle ABC, $\cos B = \frac{BC}{AB}$. Plug in the given values. $0.2 = \frac{5}{AB}$. So, $AB = 25$. Now, in the right triangle ABD, $\cos B = \frac{AB}{BD}$. Plug in the values we know. $0.2 = \frac{25}{BD}$. $BD = 125$. $BD = BC + CD$. Therefore, $CD = BD - BC = 125 - 5 = 120$.

9. C)

   Let's plug in the changes on the variables. $V = \frac{4}{3}\pi(2r)^3 = 8 \cdot \frac{4}{3}\pi r^3 = 8V$.

10. A)

    The percent increase $= C(2)^{\frac{t}{4}} = C(1 + 1)^{\frac{t}{4}}$. So, we know that the population will be increased 100% every 4 weeks after uninhibited growth begin. Or you can say the population will be doubled every 4 weeks after uninhibited growth begin.

11. D)

    If m represents the number of math assignments and e represents the number of English assignments and it took him $\frac{1}{2}$ hour for math and $\frac{3}{4}$ hour for English, we can set up an equation $\frac{1}{2}m + \frac{3}{4}e = \frac{15}{4}$.

12. C)

Split the absolute equation into two parts. $3x + 1 = -x \ and \ 3x + 1 = x$. Now, solve for x. $x = -\frac{1}{4} \ or -\frac{1}{2}$. Therefore, the equation will have two solutions.

13. D)

Let's three numbers $a < b < c$. So, $c = (1 + .20)(a + b)$ since the largest number is 20% more than the sum of the other two numbers. $a + b + c = 220$ because the sum of three numbers is 220. Plug $a + b = 220 - c$ into the first equation of c. Then, $c = (1.20)(220 - c)$. Thus, c=120.

14. C)

Let's write the zeros out. -4 (even multiplicity), 1 (even multiplicity), 4 (odd multiplicity). Now, we can set up an equation using a positive leading coefficient based on end behaviors.

(Note: If the order of a polynomial is odd with a positive leading coefficient, it moves upwards from left to right. If the order is even with a positive leading coefficient, both ends of the graph points upwards). $f(x) = (x + 4)^2(x - 1)^2(x - 4)$ is one possible polynomial function.

15. B)

Solve for another variable, l. From the given equation $t = \sqrt{\frac{k}{4hl}}$, square both sides and cross-multiply. $t^2 \cdot 4hl = k$. Now, divide both sides by $4ht^2$. Then, you get $l = \frac{k}{4ht^2}$.

16. B)

The given quadratic function is zeros form. Two zeros are 1 and 4. By the axis of symmetry from the vertex, the x-coordinate of the vertex must be the midpoint of two zeros. $x = \frac{1+4}{2} = 2.5$. We know that 2.5 belongs to the answer B) $1 < x < 3$.

17. D)

Let x be the original price of the item. Then, $d = (1 - .25)(1 + .095)x$ considering 25% discount and 9.5% tax added on the discounted price. Solve for x.

$x = \frac{d}{(1.095)(0.75)}$.

18. C)

From the right triangle, we know that two angles k and m are complementary. By the property of co-function, $\cos(m°) = \sin(k°)$.

19. D)

Since the exponential graph going upwards from left to right, the leading coefficient must be positive. Eliminate A) and B). Because the graph passes through the point (0, 2), plug the point into the equation. $2 = f(0) + 2$. So, $f(0) = 0$. now, plug x=0 into the answer choices. D) works!
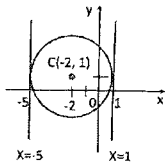
20. A)

Unit conversion. Use dimensional analysis. $\frac{15 \ in^2}{hour} \times \frac{1 \ hour}{60 \ min} \times \frac{2.54^2 \ cm^2}{1^2 \ in^2} \times \frac{1^2 \ m^2}{100^2 \ cm^2} = \frac{(15)(2.54^2) \ m^2}{(60)(100^2) \ min}$.

21. A)

We can approach graphically. Complete the circle equation.

$x^2 + 4x + 4 + y^2 - 2y + 1 = 4 + 4 + 1$. And it becomes $(x + 2)^2 + (y - 1)^2 = 9$. Now, let's graph this circle and vertical line x=k.

In order to have two real solutions, the vertical line should be located between x=-5 and x=1. Therefore, $-5 < k < 1$.

22. B)

Substitute x+2 into the h(x). $h(x + 2) = -(x + 2 - 1)^2 - 2 = -(x + 1)^2 - 2$. Thus, the coordinates of the vertex is (-1, -2). And the graph opens downwards.