TEST SET 10- ANSWER KEYS AND SCORE CONVERSION TABLE

Module 1	1	2	3	4	5	6	7	8	9	10	11
	B	B	C	A	C	B	C	A	C	D	C
	12	13	14	15	16	17	18	19	20	21	22
	C	A	D	B	A	A	B	A	140	C	D
Module 2	1	2	3	4	5	6	7	8	9	10	11
	B	C	C	A	B	C	B	D	A	D	B
	12	13	14	15	16	17	18	19	20	21	22
	A	B	19	8	1.04	C	D	C	A	B	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

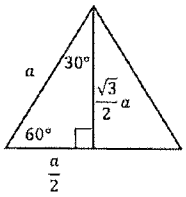
*RAW SCORE = The total number of problems correct on both module 1 (0-22) and module 2 (0-22).

Answers and explanations for Test 10 (Module 1)

1. B)
   First, find the equation of $y = f(x)$. The slope $= \frac{80-56}{18-12} = \frac{24}{6} = 4$. So, $y = 4x + b$. Plug in a point (12, 56). $56 = 4(12) + b$. $b = 8$. Thus, $f(x) = 4x + 8$. The line l will be $y = 4x + 15$. therefore, the y-intercept of line l is 15.

2. B)
   The system has a infinitely many solutions. So, you can write the solution x=k and $y = \frac{2+x}{3} = \frac{k+2}{3}$. So, $\left(k, \frac{k+2}{3}\right)$. Or you can set y=k and $x = 3k - 2$. So, $(3k - 2, k)$.

3. C)
   Based on the figure, The area of equilateral triangle is $\frac{\sqrt{4}}{3}a^2$, where a is the length of a side. $\sqrt{3} = \frac{\sqrt{3}}{4}a^2$. So, $a = 2$.



   The height of an equilateral triangle is $\frac{\sqrt{3}}{2}a = \frac{\sqrt{3}}{2} \cdot 2 = \sqrt{3}$. This is equal to $k\sqrt{3}$. Therefore, $k = 1$.

4. A)
   The speed of water 0 meters down from the top of the mountain means the initial speed of water at the top of the mountain.

5. C)
   $y = g(x)$ is the result of translating 3 units down from $f(x) = -\frac{1}{7}x^2$. So, $g(x) = -\frac{1}{7}x^2 - 3$.

6. B)
   $3(x + k) = 3x + 3k$. This should be equal to the right side of the given equation. $ax + b$. Comparing both expressions, we get $a = 3$ and $b = 3k$.

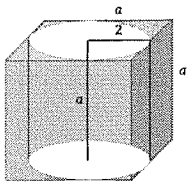
7. C)
   In the equation $(t) = 15(1.2)^t$, 15 is the number of customers when the restaurant just opened and 1.2 means that the number of customers will be increased by 20% every year.

8. A)
   Let's divide the given equation by 2 on both sides. $2x - 3y = 7t$. Now, factor the given expression $4x^2 - 12xy + 9y^2 = (2x - 3y)^2$. We can substitute the first equation into the last expression. Then, $(2x - 3y)^2 = (7t)^2 = 49t^2$.

9. C)
   The given function $f(x)$ is a quadratic function open downward. So, the vertex is the maximum value of the function. Therefore, the maximum is 5 (y-value).

10. D)
    In the given equation $h = 24.5 - 2.1t$, 2.1 means that the height will decrease 2.1 yard every second.

11. C)
You can set up an equation $5{,}000 \geq 500 + 25.75x$. now, solve for x. $x \leq 174.757$. so, the greatest number of attendees within the budget will be 174.

12. C)


The volume of the space in the cube not taken by the cylinder can be computed by subtracting the volume of cylinder from the volume of cube.
$a^3 - \pi\left(\frac{a}{2}\right)^2 \cdot a = a^3 - \frac{\pi}{4}a^3 = a^3\left(1 - \frac{\pi}{4}\right)$.

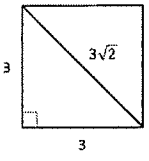
13. A)
Use the answer choices. Only A) $\sqrt[56]{x^{40}} = x^{\frac{40}{56}} = x^{\frac{5}{7}}$.

14. D)
Let's set up equations. $T = J - 0.06J = 0.94J$. This is equivalent to kJ.
Therefore, k=0.94.

15. B)
The value of oil painting will increase by 1% of its value of the previous year. So, you can set up $y = p(1 + 0.01)^t = p(1.01)^t$. therefore, it is an exponential increasing.

16. A)
$2x^2 - 4x + 2y^2 + 8y = -4$. The circle equation passes through two points on the y-axis. So, substitute x=0 into the equation. Then you get $2y^2 + 8y = -4$. and it becomes $y^2 + 4y + 2 = 0$. Use the fundamental theorem of algebra. The sum of two roots is $-\frac{b}{a} = -\frac{4}{1} = -4$.

17. A)
Two lines are perpendicular. Then, the slopes of two lines are opposite reciprocal. From the first equation, the slope is $\frac{4}{7}$. Therefore, the slope of the second line $-\frac{k}{m} = -\frac{7}{4}$. So, $\frac{k}{m} = \frac{7}{4}$. In A), The slope of the first equation is $\frac{8}{7}$. and the slope of the second equation is $-\frac{k}{2m} = -\frac{1}{2} \cdot \frac{7}{4} = -\frac{7}{8}$ which is opposite reciprocal of $\frac{8}{7}$.

18. B)


The right triangle formed by drawing the diagonal on the square is 45-45-90 degrees right triangle. Use the Pythagorean triple $x - x - \sqrt{2}x$. So, the perimeter of the square is $3 \times 4 = 12\ inches$.

19. A)
When $t = 0$, $h(0)$ represents the initial height of the soccer ball before it was kicked. Since the ball was kicked from the top of the building, $h(0) = 12$ meter means the height of the building from the ground.

20. 140

The budget the school teacher has is \$700. The teacher must purchase 500 wooden pencils. So, the teacher has \$350 left after purchasing pencils. ($700 - 500 \times 0.7 = 350$). And the cost of a mechanical pencil is \$2.50. so, the maximum number of mechanical pencils the teacher can purchase is $350 \div 2.50 = 140$.

21. C)

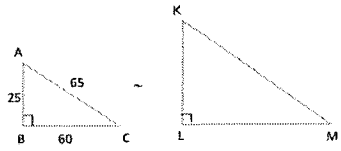
Since $\angle AOB$ and $\angle BOC$ are linear pair, they are supplementary angles. So, $\angle BOC + \angle AOB = 180$. And we know $\angle BOC = 5\angle AOB$ from the given. Substitute the relation into the first equation. $5\angle AOB + \angle AOB = 180$. Thus, $\angle AOB = 30°$. Because $\angle AOB \; and \; \angle COD \; are \; vertical \; angles$, they are congruent angles. Therefore, the length of an arc CD is $2\pi(5) \times \frac{30}{360} = \frac{5}{6}\pi$.

22. D)

If the company makes 200% more than its number of cars its previous year. It means the number will be 3 times of its previous value. Then you can set up $p(x) = 130(3)^x$.

Answers and explanations for Test 10 (Module 2)

1. B)
When you reduce the lengths of sides, 25-60-65 becomes 5-12-13. So, the triangle is a right triangle. Let's draw the right triangles.



Since two triangles are similar, all sides are in proportion. Thus, $sinK = sinA = \frac{60}{65} = \frac{12}{13}$.

2. C)
Based on information given, $k = (1 - 0.80) \cdot m.$ and $m = (1 + 1.20) \cdot 58.$ thus, $m = 127.6$ and substitute it into the first equation. Then, $k = 0.2 \cdot 127.6 = 25.52.$

3. C)
The equation of line l is $y = \frac{2}{3}x - \frac{3}{2}$. This should be equivalent to $y = h(x) - 5$. Therefore, $h(x) - 5 = \frac{2}{3}x - \frac{3}{2}$. And $h(x) = \frac{2}{3}x + \frac{7}{2}$.

4. A)
Let's start from z days and use the dimensional analysis.
$g = z\ days \times \frac{1\ gal}{6\ days} \times \frac{3.785\ l}{1\ gal} = \frac{(3.785)\cdot(z)}{6}$.

5. B)
You can calculate using the opposite percent. $67 \times (1 - .30) = 46.9 \approx 47.$

6. C)
Distance = speed x time. So, $4.5 \times r + 2 \times s + 43 \times c = 32.$

7. B)
Let's isolate the variable c. $\frac{1}{c} = 1 - 2a + \frac{1}{6b}$. Thus, $\frac{1}{c} = \frac{6b}{6b} - \frac{12ab}{6b} + \frac{1}{6b}$. And combine terms. $\frac{1}{c} = \frac{6b-12ab+1}{6b}$.
Therefore, $c = \frac{6b}{6b-12ab+1}$.

8. D)
Plug the point (-10, k) into both inequalities. $k \leq -2\ and\ -10 < 2k - 4$. Therefore, $-3 < k \leq 2$. So, only D) -3 doesn't belong to this range of x.

9. A)
Because x is the number of years since the end of 2001, $f(0) = 5{,}000(1.13)^0 = 5{,}000$ means the number of hand fans the company manufactured at the end of 2001.

10. D)
If the question asks about the number of solutions for the quadratic equation, use the discriminant to determine the number of solutions. $D = b^2 - 4ac = (-3)^2 - 4\left(-\frac{1}{2}\right)(4) = 9 + 8 = 17 > 0$. Since $D > 0$, the quadratic equation should have two real solutions.

11. B)
If the system of linear equations has no solution, then two lines must have the same slope (Two parallel lines won't have an intersection). The given equation has $\frac{2}{3}$ as the slope. So, only B) $2x - 3y = 0$ has the same slope $\frac{2}{3}$.

12. A)
Sketch the graphs to see which one touches x-axis. only A) touches x-axis because its center is located at (2, 1) and its radius is 1.

13. B)
Five ways to prove triangles congruency: SSS, SAS, ASA, AAS, HL. Since two given triangles have two congruent sides and we have the answer choices only for the angles, we know that we would use SAS method. So, the included angle should be located between two sides. $\angle C \cong \angle R$.

14. 19
The greatest possible difference between the mean of data A and the mean of data B is when the mean of data A has the greatest value and the mean of data B has the least value. Thus, the greatest mean value of data A is $\frac{3\times19+4\times29+6\times39+4\times49}{17} = 35.47$ and the least mean value of data B is $\frac{0\times3+10\times4+20\times6+30\times4}{17} = 16.47$. so, the greatest difference would be $35.47 - 16.47 = 19$.

15. 8
For a rational expression to be undefined, set the expression on the denominator equal to zero. So, $(2-x)^2 + 4(2-x) + 4 = 0$. Simplify it. $x^2 - 8x + 16 = 0$. so, the sum of roots of a quadratic equation is $-\frac{b}{a} = -\frac{-8}{1} = 8$ using the fundamental theorem of algebra.

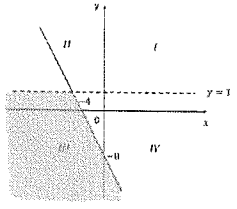
16. 1.04
The equation for the compound interest problem with 4% annual interest will be $Balance = initial\ deposit \times (1 + \%\ in\ decimal)^{the\ number\ of\ years}$. Thus, the equation is $Balance = 1{,}300(1 + 0.04)^t$, where t is the number of years after the initial deposit. Therefore, $x = 1.04$.

17. C)
The fraction $= \frac{the\ number\ of\ computers\ sold\ in\ 2012}{the\ number\ of\ computers\ sold\ in\ 2014} = \frac{35}{80} = \frac{7}{16}$.

18. D)
The total amount: \$200,000, down-payment: \$50,000, M months, and \$x each payment. So, you can set up an equation $200{,}000 = 50{,}000 + xM$.

19. C)
The total cost consists of one-time charge along with daily rate. So, $f(x) = 45 + 65x$, where x is the number of days Mary Ellen rents the truck.

20. A)
Let's graph both inequalities on the XY-plane.



In the figure on the left, there are no solutions on the quadrant I.

21. B)
When the survey has a larger size of sample, the result of the survey will have smaller size of margin of error since margin of error $= z \times \frac{s}{\sqrt{n}}$, where z is z-score, s is the standard-deviation, and n is the sample size. (n is located on the denominator!)

22. B)
Because square A has a perimeter of 16 inches, its length of a side is 4 inches. The length of a side of square B is three times the length of a side of square A. so, the length of a side of square B is 12 inches. Now, the length of diagonal of square B is $12\sqrt{2}$ inches using the Pythagorean triple $x - x - \sqrt{2}x$.