TEST SET 5 - ANSWER KEYS AND SCORE CONVERSION TABLE

Module 1	1	2	3	4	5	6	7	8	9	10	11
	125	60	C	A	1/3	C	C	2	B	C	B
	12	13	14	15	16	17	18	19	20	21	22
	C	B	A	45	C	A	4	A	D	C	C
Module 2	1	2	3	4	5	6	7	8	9	10	11
	B	D	B	A	D	1	A	D	D	C	A
	12	13	14	15	16	17	18	19	20	21	22
	B	A	D	C	A	C	C	60	A	B	A

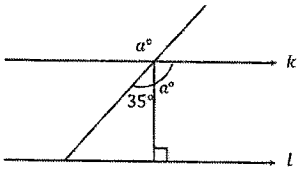
MATH SCORE COVERSION TABLE (SCALED SCORES: 200-800)

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 5 (Module 1)

1. 125



The marked angle is also $a°$ because vertical angles are congruent. And two parallel lines cut by a perpendicular line, the same side interior angles are congruent and supplementary. That means those two same side interior angles are right angles. Therefore, $\angle a = 90 + 35 = 125°$.

2. 60

You will choose one selection from each category. So, the product of each selection will get you the answer. $5 \times 4 \times 3 = 60$. Or you can also do $\binom{5}{1} \cdot \binom{4}{1} \cdot \binom{3}{1} = 60$ using the combinations.

3. C)

The equation shows the battery in kWh left in the EV after m miles traveled. Thus, 1.76 means the EV car uses 1.76 kWh per mile.

4. A)

The polynomial function has zeros at x=1, 3, and 5. So, we know that there is no additional zero between 1 and 3. Therefore, the function can't have another zero at $(a, 0)$ which means the value of b is not possible to be 0.

5. $\frac{1}{3}$

Solve for L. $-18L = 24M - 6K$. Divide -18 on both sides of the equation. Then, $L = -\frac{4}{3}M + \frac{1}{3}K$. Thus, $a = \frac{1}{3}$. (Note: a is the coefficient of the variable K)

6. C)

$x^2 + 1 = 4x$. Rewrite the equation in order. $x^2 - 4x + 1 = 0$. Now, use the quadratic formula to solve for x. $x = \frac{4 \pm \sqrt{16-4}}{2} = \frac{4 \pm 2\sqrt{3}}{2} = 2 \pm \sqrt{3}$. Compare it to the given form $x = k \pm \sqrt{m}$.
Therefore, $k = 2 \; and \; m = 3$. $m - k = 1$.

7. C)

The number of students who got 3.0 or above in their GPA is 7. Thus, the percent is $\frac{7}{11} \times 100 = 63.6364 \approx 63.6\%$. (to the nearest tenth)

8. 2

$h(k) = 2f(k) - 1$. Substitute the given information into the equation.
$1 = 2(k^2 - 3) - 1$. Solve for k. $k = 2 \; or \; -2$. Since k is a positive number, k=2.

9. B)

We can set up an equation for the linear function. Use two points to find the slope. (-2, 3) and (4, 0). $m = \frac{0-3}{4+2} = -\frac{1}{2}$. Thus, you get $y = -\frac{1}{2}x + b$. Plug (4, 0) into the equation. Then, $y = -\frac{1}{2}x + 2$. Therefore, y-intercept is 2.

10. C)
The number of students who chose cupcake as their favorite snack is 53. Thus, the probability of selecting a student whose favorite snack was a cupcake is $\frac{53}{150}$.

11. B)
$8^{a-b} = 16^3$. We can rewrite this equation. $(2^3)^{a-b} = (2^4)^3$. And $2^{3(a-b)} = 2^{12}$.
Thus, $a - b = 4$. Next, $27^{a+b} = 9^3$. It can also be rewritten as $(3^3)^{a+b} = (3^2)^3$.
And $3^{3(a+b)} = 3^6$. Thus, $a + b = 2$. therefore, $b^2 - a^2 = (b-a)(b+a) = -(a-b)(a+b) = -(4)(2) = -8$.

12. C)
The total charge for the plumbing service consists of one-time basic charge plus an hourly rate. So, you can set up an equation such as $Total\ charge = (the\ hourly\ rate) \times (time\ worked\ in\ hours) + onetime\ basic\ charge$. Thus, the slope means the hourly rate.

13. B)
$\frac{x^{\frac{5}{3}}(x^4)^3}{x^{-\frac{2}{3}}} = \frac{x^{\frac{5}{3}+12}}{x^{-\frac{2}{3}}} = x^{\frac{41}{3}+\frac{2}{3}} = x^{\frac{43}{3}} = x^{14+\frac{1}{3}} = x^{14} \cdot x^{\frac{1}{3}} = x^{14}\sqrt[3]{x}$.

14. A)
Complete the square. Divide the equation by 3 on both sides. $x^2 - 2x + y^2 + 4y = \frac{2}{3}$.
And $x^2 - 2x + 1 + y^2 + 4y + 4 = \frac{2}{3} + 1 + 4$. Finally, $(x-1)^2 + (y+2)^2 = \frac{17}{3}$. Thus, $r^2 = \frac{17}{3}$.
$r = \sqrt{\frac{17}{3}}$. The circumference of the circle is $2\pi r = 2\pi\sqrt{\frac{17}{3}} = 2\pi\frac{\sqrt{51}}{3}$ or $\frac{2\sqrt{51}\pi}{3}$.

15. 45
First, find the x-intercepts. $0 = -x^2 + 4x + 5$. $0 = -(x-5)(x+1)$. Thus, $x = -1\ and\ 5$. Now, the x-coordinate of the vertex is the midpoint of two x-intercepts. $h = \frac{-1+5}{2} = 2$. Y-coordinate of the vertex is $-2^2 + 4 \cdot 2 + 5 = -4 + 8 + 5 = 9$ when you plug x=2 into the equation. Therefore, the area of the rectangle is $(OC) \times (BC) = 5 \times 9 = 45$.

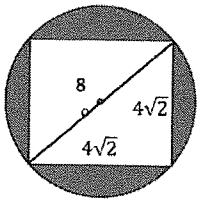
16. C)
First, the area of book case. $2.5\ cm \times 3\ cm = 7.5\ cm^2$. Now, change it into ft^2. The given scale is 1 cm = 2 ft. so, $1cm^2 = 4\ ft^2$. $7.5\ cm^2 \times \frac{4ft^2}{1cm^2} = 30ft^2$.

17. A)
The probability that at least one person has been abroad = 1 – the probability that no one has been abroad. The number of tourists who never been abroad is $50 \times .2 = 10$. So, the probability is $1 - \left(\frac{10}{50}\right)\left(\frac{9}{49}\right)\left(\frac{8}{48}\right) = 1 - \frac{3}{490} = \frac{487}{490}$. Or you can also calculate using combinations. $1 - \frac{\binom{10}{3}}{\binom{50}{3}} = 1 - \frac{3}{490} = \frac{487}{490}$.

18. 4
Let's plug x=6 into the given equation. $h(6) = 2g(6) + k$. So, $8 = 2 \cdot g(6) + k$. Now use the first function given. $g(6) = \sqrt{\frac{12}{3}} = \sqrt{4} = 2$. So, $8 = 2 \cdot 2 + k$. Therefore, $k = 4$.

19. A)

Since the area of circle (πr^2) is 16π, the radius of the circle is 4. And the diameter is 8.

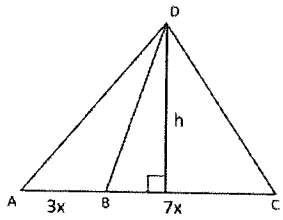


The right triangle on the left should be 45-45-90 degrees triangle. So, we use Pythagorean triples to find the length of sides. The area of the shaded region = The area of the circle – the area of square. Thus, The area of the shaded region = $16\pi - \left(4\sqrt{2}\right)^2 = 16\pi - 32$.

20. D)

The compound interest problem. The balance = $A(1 + \%\ in\ decimal)^x$, where A is the deposit and x is the number of years after deposit. Now, compare it with the given function. Then, you get 0.05 as the percent in decimal. Therefore, P percent means 5 percent.

21. C)



The area of triangle ABD is 210. Based on the figure on the left, $210 = \frac{1}{2}(3x)(h)$. So, $xh = 140$. Now, the area of triangle BCD is $\frac{1}{2}(7x)(h) = \frac{7}{2}xh = \frac{7}{2} \times 140 = 490$.

22. C)

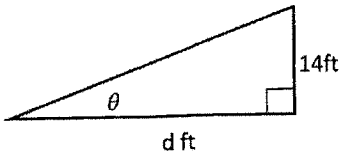
The two x-intercepts are equally space out from the vertex. So $a = 6$. The equation of a line which passes through (6, 0) and (0, 5) is $y = -\frac{5}{6}x + 5$.

Answers and explanations for Test 5 (Module 2)

1. B)
   $x^4 - 1 = (x^2 - 1)(x^2 + 1) = (x - 1)(x + 1)(x^2 + 1)$. Statement I and II are true.

2. D)
   Let's make the equation into slope intercept form. The first equation will be $y = 2x - 3$ and the second equation will be $y = 2x - 3$ too. That would mean there are infinitely many solutions to the system.

3. B)



   In the figure left, $tan\theta = \frac{14}{d}$. Now, solve for d. $d = \frac{14}{tan\theta}$.

4. A)
   If $sin\angle A = cos\angle B$, we know that angle A and B are complementary angles. Thus, the angle C must be a right angle. I is true. But triangle ABC doesn't have to be isosceles right triangle. And it can't be an obtuse triangle.

5. D)
   Since the parabola opens downward, the leading coefficient must be negative. $a < 0$. And the x-coordinate of the vertex is positive. So, $-\frac{b}{2a} > 0$. We know that $a < 0$. therefore, $b > 0$. lastly, c is the y-intercept which is positive from the graph. So $c > 0$.

6. 1
   The maximum value of the function h is 5. So, $m = 5$. Now, $f(a) = 5$. from the table, $a = 1$.

7. A)
   The size of gap between sections is a linear function. Use two points given. (45, 2.58) and (85, 1.12). we can set up an equation. $m = \frac{2.58-1.12}{45-85} = \frac{1.46}{-40} = -0.0365$.
   $y = -0.0365x + b$. Plug the point (45, 2.58) into the equation to find the value of b. $b = 4.2225$. therefore, $y = -0.0365x + 4.2225$. now, plug x=110 into the equation. You get $y = -0.0365 \times 110 + 4.2225 = 0.2075$.

8. D)
   Plug x=3 into the given equation. $\frac{f(6)}{3} = -h(3) + 6 = -4 + 6 = 2$. Therefore, $f(6) = 6$.

9. D)
   Since x=1 is one of the solutions to the equation, plug x=1 into the equation. Then, $\frac{2+16}{a} = 144$. So, $a = \frac{18}{144} = \frac{1}{8}$.

10. C)
    The most reasonable inference we can get is that most people who used a phone with internet service won't go back to a cheaper phone without internet service.

11. A)

The number of households that purchased cats for their pet was 12. The total number of households that had a cat as their pet was 17. Therefore, the fraction is $\frac{12}{17}$.

12. B)

The area of the square base of a certain box is 289. So, $x^2 = 289. x = 17\ inches$. The perimeter of the square base is $4 \times 17 = 68\ inches$. The restriction of the size of the box is that $68 + h \leq 120$. Thus, $h \leq 52$.

13. A)

$$
\begin{array}{r|l}
x+2 & -2x+5 \\
\cline{2-2}
 & -2x^2+x-4 \\
 & -2x^2-4x \\
\cline{2-2}
 & 5x-4 \\
 & 5x+10 \\
\cline{2-2}
 & -14
\end{array}
$$

In the long division on the left, we know that $-2x + 5 + \frac{-14}{x+2}$.

14. D)

Make a small table for the numbers given.

C	F
5	41
15	59

From the table on the left, F values changed 59-41=18.

15. C)

By the axis of symmetry, the x-coordinate of the vertex is the midpoint of two zeros. Thus, x coordinate of the vertex = $\frac{-1+4}{2} = 1.5$.

16. A)

Zeros are -2, 0, 7. Therefore, by the factor theorem, Factors will be $x, (x + 2), and\ (x - 7)$.

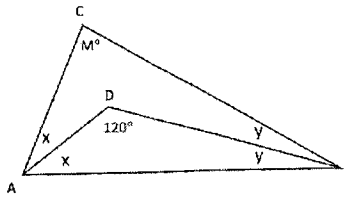
17. C)

x: the number of juniors, y: the number of seniors. Based on the description, you can set up $x + y \geq 12, x \geq 3, y \geq 5, and\ 3x + 2y \leq 180$.

18. C)

The average number of defective light bulbs per box is $\frac{2\times3+3\times1+6\times2+4\times3}{15} = 2.2$.

19. 60



in triangle ABD, $x + y = 60°$. Multiply 2 on both sides. You get $2x + 2y = 120°$. In triangle ABC, $2x + 2y + M = 180°$. So, substitute $2x + 2y = 120°$ into the last equation. Then, M= $60°$

20. A)
Because the areas under the curve are same on both graphs. It means that the total distances traveled are same. Their average speeds are same because their total distance traveled and total times elapsed are same. Jerry didn't turn around. He got slower in velocity after the peak velocity.

21. B)
For the income of $45,000, The actual percent is 5.5 and the predicted percent by the line of best fit is 4.5. therefore, the difference is 5.5-4.5=1.

22. A)
Let's apply the percent change of each variable into the original equation. Then,
$V = \pi(2r)^2\left(\frac{1}{2}h\right) = 2\pi r^2 h$. Thus, the volume became double. In other words, it increased by 100%.