TEST SET 6 - ANSWER KEYS AND SCORE CONVERSION TABLE

Module 1	1	2	3	4	5	6	7	8	9	10	11
	A	C	B	C	A	C	A	288	A	B	B
	12	13	14	15	16	17	18	19	20	21	22
	D	C	11.2	B	B	1.73	C	30	2	B	A
Module 2	1	2	3	4	5	6	7	8	9	10	11
	5.3	A	B	1/2	C	A	D	D	C	A	B
	12	13	14	15	16	17	18	19	20	21	22
	250	A	D	C	B	B	33	B	A	3	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 6 (Module 1)

1. A)
The slope of the line is 2 and passes through the point (-4, 2). So, you can set up an equation of the line. $y = 2x + b$. Plug in the point (-4, 2). You get $y = 2x + 10$. X-intercept is (-5, 0) and Y-intercept is (0, 10). Thus, the area of the triangle formed by the line will be $\frac{1}{2}(5)(10) = 25$.

2. C)
The probability of being defective is $\frac{4}{200}$ and the probability of not being defective is $1 - \frac{4}{200} = \frac{196}{200}$. We can compute the probability that at least one is defective as follows. P (at least one is defective) = 1- P (none of them are defective). Therefore, $P = 1 - \left(\frac{196}{200}\right)\left(\frac{195}{199}\right) = \frac{79}{1990}$.

3. B)
The distance traveled (x) and the remaining gas in the tank (y) is inversely proportional just like the scatter plot. The rest of answer choices are directly proportional.

4. C)
The center of the circle is the mid-point of two points. So, $C\left(\frac{-1+1}{2}, \frac{3-3}{2}\right) = (0, 0)$. And the diameter of the circle is $\sqrt{(-1-1)^2 + (3+3)^2} = \sqrt{40} = 2\sqrt{10}$. thus, the radius of the circle is $\sqrt{10}$. *Now*, you can set up the circle equation. $x^2 + y^2 = 10$.

5. A)
When you substitute x=0, you get 1.34 million. It means that there are 1.34 million EV in that state in 2020 because x is the number of years after 2020.

6. C)
Let's solve the system by substitution method. $x - 3 = -2x^2$. Rewrite it as the standard form and factor it. $2x^2 + x - 3 = 0$ *and* $(2x + 3)(x - 1) = 0$. So, $x = 1$ *or* $-\frac{3}{2}$. We are looking at the intersection at the fourth quadrant (X, Y) = (+, -). So, $x = 1$. Therefore, $y = 1 - 3 = -2$.

7. A)
Based on the description the number of vehicles in stock in the factory on each day as follows.
Mon: 20,000, Tue: 20,000-8,000+12,000=24,000, Wed: 24,000+6,000=30,000, Thu: 30,000-15,000+13,000=28,000, Fri: 28,000-20,000=8,000. It matches with the answer choice A) only.

8. 288
Let's say three numbers are x, y, and z. you can set up equations based on the information given. $x + y + z = 720$. $x + y = 1.5z$. substitute the second into the first equation. You get $1.5z + z = 720$. Therefore, $z = 288$.

9. A)
Considering the margin of error, the mean working time for this brand phone battery will be between 5.4 and 5.8 hours. The mean working time is $the\ estimated\ mean \pm margin\ of\ error$.

10. B)

If you check the slopes of any two points in the table, it is always $\frac{3}{2}$. It is a linear function. You can set up the linear equation. $y = \frac{3}{2}x + 1$. To find the x-intercept, set y=0 and solve for x. thus, $x = -\frac{2}{3}$.

11. B)

Let's say x is the length of the entire trail he jogs every morning. Now, since 2 miles left to complete it after p percent of the entire length. We can set up an equation. $2 = x - x \times \frac{p}{100}$. So, factor the right side in term of x. $x\left(1 - \frac{p}{100}\right) = 2$. Solve for x. $x = \frac{2}{1-\frac{p}{100}}$. Multiply 100 on both the numerator and the denominator. Then, $x = \frac{200}{100-p}$.

12. D)

Use Process of elimination. Only D) (1, 0) works for both inequalities.

13. C)

x-intercept means that it is the time, in minutes, for the test battery to use the batter power, kWh, completely (y=0).

14. 11.2

The length of diagonal in a rectangular solid is $\sqrt{a^2 + b^2 + c^2} = \sqrt{8^2 + 6^2 + 5^2} = 5\sqrt{5} \approx 11.2$.

15. B)

The exponential function is $f(x) = a \cdot b^x$ assuming $a\ and\ b\ are\ positive\ constants$. If $b > 1$, the function increases exponentially. If $0 < b < 1$, the function decreases exponentially. Therefore, $1 + \frac{b}{100} > 1$. So, the given function increases exponentially.

16. B)

The given scatter plot shows positive correlation and also relatively strong relationship between x, y variables.

17. 1.73

The balance in his savings account will be $2000 \cdot (1 + .2)^3$ based on the information given. Now, it must be equivalent to $2000b$. Thus, $b = (1 + .2)^3 = 1.728 \approx 1.73$.

18. C)

In the shaded region, we know that $y \geq -2$. Eliminate D). And we also know that $x \leq 3$. Eliminate B). And finally, we know that the slope of the third line is positive in the graph, so the answer must be C).

19. 30

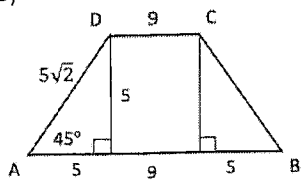
The maximum number of tools (y-value) is the vertex of the quadratic function. So, we will need to find the x-coordinate of the vertex. $x = -\frac{b}{2a} = -\frac{120}{2(-2)} = 30$. Therefore, the manufacturer can sell the most at the unit price of the tool of $30.

20. 2

Plug x=6 into the given functions. $h(6) = \frac{3g(6)}{2}$. Thus, $g(6) = \frac{2}{3} \times h(6) = \frac{2}{3} \times 6 = 4$.

From the first equation, $g(6) = \sqrt{\frac{2 \cdot 6}{3}} + k$. So, $k = 4 - 2 = 2$.

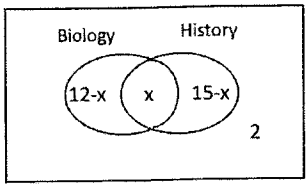
21. B)



In the figure on the left, use Pythagorean triple 45-45-90 degrees. $x - x - x\sqrt{2}$. Then you can find the dimensions in the figure. So, the area of trapezoid ABCD is $\frac{1}{2}(9 + 19) \cdot 5 = 70$.

22. A)

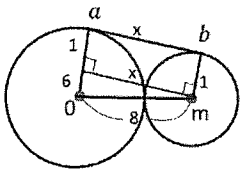
Let's draw the Venn diagram.



You can set up a Venn diagram based on the information given. Now, add all numbers to get 20. $12 - x + x + 15 - x + 2 = 20$. And collect like-terms. $-x + 29 = 20$. So, $x = 9$. Therefore, the probability that a randomly selected student from the 35 students takes both subjects is $\frac{9}{20}$.

Answers and explanations for Test 6 (Module 2)

1. 5.3



draw an additional parallel line to $\overline{ab}$ from the center m to $\overline{oa}$. Then, you have a right triangle as shown in the diagram. Now use Pythagorean theorem to find the value of x. note that the length of segment ab is same as the length of the additionally drawn segment (x). thus, $6^2 + x^2 = 8^2$. So, $x = 2\sqrt{7} \approx 5.3$.

2. A)
The total number of lakes which have medium depth in the table is 217. And the number of high alkalinity level lakes in the medium depth is 98. Therefore, the probability will be $\frac{98}{217}$.

3. B)
The height of the mountain is $x + y$ in the figure. Now, from the upper right triangle, $\tan(20°) = \frac{x}{200}$. From the lower right triangle, $\tan(30°) = \frac{y}{200}$. Therefore, $x + y = 200\tan(20°) + 200\tan(30°)$.

4. $\frac{1}{2}$
Substitute the first equation into the second equation. Then, you get $x^2 - 2kx + 2x + k^2 = 0$. Collect like-terms. $x^2 + (2 - 2k)x + k^2 = 0$. For this quadratic equation to have only one solution (it means that two graphs intersect only at one point), the discriminant must be zero. So, $b^2 - 4ac = (2 - 2k)^2 - 4k^2 = 0$. Simplify. $-8k + 4 = 0$. so, $k = \frac{1}{2}$.

5. C)
Since the graph opens upward, $a > 0$. And y-intercept is positive. So, $c > 0$. Now, the x-coordinate of the vertex is negative. So, $-\frac{b}{2a} < 0$. Thus, $b > 0$.

6. A)
$x^{\frac{2}{7}}\left(x^{\frac{1}{2}} \cdot x^{\frac{1}{3}}\right)^{\frac{6}{7}} = x^{\frac{2}{7}} \cdot x^{\frac{3}{7}} \cdot x^{\frac{2}{7}} = x^{\frac{2}{7}+\frac{3}{7}+\frac{2}{7}} = x^{\frac{7}{7}} = x^1$. Therefore, $m = 1$.

7. D)
A worker gets paid \$40 every hour is a linear function. The equation will be $p(t) = 40t$, where t is the number of hours worked. If the annual interest is 3%, the equation will be $A(t) = p(1.03)^t$. so, it is an exponential growth function. And if the population is doubled every day, the equation will be $p(D) = A \cdot 2^D$. So, it will be exponential growth function. And if the salary increases 20% every year, the equation will be $S(t) = P \cdot (1.20)^t$. it is also exponential growth.

8. D)
If the number of orders for a certain item increase, the number of items left in stock at the store decreases. So, it has a negative correlation. A), B), and C) are all positive correlation.

9. C)
$\frac{3}{5} \times 500 = 300$ people are for affirmative action. And $\frac{4}{25} \times 500 = 80$ people are against it. Therefore, $500 - 300 - 80 = 120$ people didn't respond the question.

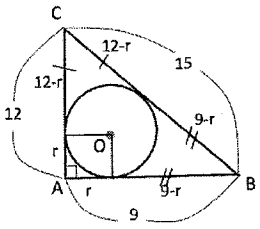
10. A)
From the given equation $2.50 + 0.20x = 5.10$. The number 0.20 represents the rate of change, in dollars per week, in the average price per pound of grapes.

11. B)
The formula for the area of sector in radian is $A = \frac{1}{2}r^2\theta$. Change $60°$ into radian. $60° \times \frac{\pi}{180°} = \frac{\pi}{3}\ radian.$ Plug all values to the area formula. $20\pi = \frac{1}{2} \cdot r^2 \cdot \frac{\pi}{3}$. Therefore, $r = \sqrt{120} = 2\sqrt{30}$.

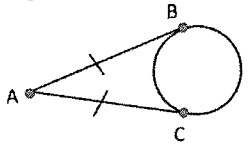
12. 250
The number of ants came out when the scientist first time recorded is 125 (x=0) and the number of ants came out 10 days after the date the scientist started to record is 375. So, the positive difference between two numbers is 250.

13. A)
Let's factor the given expression. $-8x^3 + 28x^2 - 12x = -4x(2x^2 - 7x + 3) = -4x(2x - 1)(x - 3)$. Thus, if $ax - 1$ is a factor, $a = 2$.

14. D)
We can set up a quadratic equation. The vertex is at (3, 180). $y = a(x - 3)^2 + 180$. Now, the cannon ball was launched from the ground. Plug the point (0, 0) into the equation. $0 = 9a + 180$. so, $a = -20$. We have the equation now. $y = -20(x - 3)^2 + 180$. Plug x=2 (2 seconds) into the equation. You get $y = 160\ ft$.

15. C)


Draw two perpendicular radii to both $\overline{AC}$ and $\overline{AB}$. And BC = 15 using 3-4-5 Pythagorean triple. If two segments are drawn from a point to two tangential points to the circle, then the lengths of two segments are congruent as shown below.

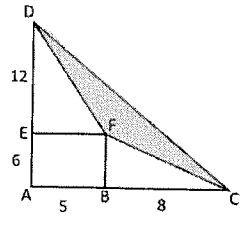


now, we can set up $(12 - r) + (9 - r) = 15$. So, $r = 3$. Therefore, the area of the circle O is $\pi 3^2 = 9\pi$.

16. B)
Two x-intercepts are 6 and -2. So, the x-coordinate of the vertex of the function will be the mid-point of two x-intercepts by axis of symmetry. Thus, $\frac{6-2}{2} = 2$.

17. B)
The delivery company wants to earn at least \$4,000 by delivering 100 chairs for \$50 each. Now, you can set up an equation for this situation. $50 \times 100 - 250 \times x \geq 4{,}000$.
Solve for x. then you get $x \leq 4$. Therefore, the maximum number of chairs that can be broken during transport is 4.

18. 33



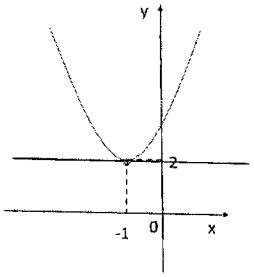
To find the area of shaded region is $\Delta ACD - \Delta DEF - \Delta BCF - ABFE. \frac{1}{2}(13)(18) - \frac{1}{2}(5)(12) - \frac{1}{2}(8)(6) - (5)(6) = 33.$

19. B)

"No more than "means "less than or equal to." so, if x represents the number of catfish and y represents the number of trout, then, you can set up inequalities as follows.
"$x \leq 10, y \leq 5, and\ x + y < 11$".

20. A)

First, $f(x) + 12 = 2x^2 + 4x - 8 + 12 = 2x^2 + 4x + 4$. So, the x-coordinate of the vertex of the parabola is $-\frac{b}{2a} = -\frac{4}{4} = -1$ and the y-coordinate of the vertex is $2(-1)^2 + 4(-1) + 4 = 2$. Now, let's graph both equations.



In the figure on the left, we know that $h(x) = a$ (horizontal line) is to be less than or equal to $f(x) + 12$. Therefore, the maximum value of a is 2.

21. 3

To change from degrees to radians, multiply $\frac{\pi}{180°}$. So, $135° \times \frac{\pi}{180°} = \frac{3}{4}\pi$. Now, compare it with $\frac{k}{4}\pi$. Therefore, $k = 3$.

22. A)

Noah's budget is \$30,000 to purchase floor tables. The cost of one table including tax is $\$450 \times 1.1 = \$495$. So, $30{,}000 \div 495 = 60.6$. therefore, he can purchase 60 floor tables within budget. Note: you don't round up because the budget is not enough to purchase 61 floor tables.