

TEST SET 8- ANSWER KEYS AND SCORE CONVERSION TABLE

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

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 8 (Module 1)

1. B)

If two figures are similar, all interior angles are congruent and all sides are in proportion. So, the perimeters of two figures are also in the same proportion. I and II are true. The length of \overline{FG} is not known but we know that GH is 20 because BC is 10 using the proportion. III is false.

2. D)

The standard form of a quadratic function shows the y-intercept. (Think about putting $x=0$ in the standard form of a quadratic function, $ax^2 + bx + c$. You see the value of c is the y-intercept.)

3. A)

If the outlier is removed from the data, the range is affected the most and the mean is the next, and the median and mode won't be affected much compared other values.

4. C)

The slope of parallel line is $-\frac{1}{2}$. We get $y = -\frac{1}{2}x + b$. Plug $(4, 0)$ into the equation. Then you get $b=2$.

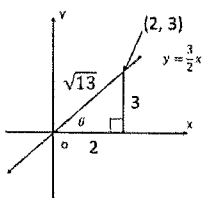
5. $\frac{2}{5}$

Factor the left side by x . $x(2 - 5k) = 26$. $x = \frac{26}{2-5k}$. So, the value of x is undefined when $k = \frac{2}{5}$.

6. B)

Let's write the favorable number is the constraint. $\{1, 2, 3, 4, 5, 11, 12, 13, 14, 15\}$. A total of 10 numbers. The probability is $\frac{10}{15} = \frac{2}{3}$.

7. D)



The point $(2, 3)$ is one of points on the line as shown. Find the lengths of sides using Pythagorean theorem and coordinates. Then, you get $\sin\theta = \frac{3}{\sqrt{13}}$.

8. D)

Use triangle inequalities. Let's say the lengths are a, b, x . Then, $a - b < x < a + b$.

If the length of the third side is x , then $5 < x < 15$. Therefore, the perimeter of the triangle should be in $20 < p < 30$.

9. C)

Let a = Amelie's current age and p = Peter's current age. You can set up an equation. $a - 2 = 2 \cdot (p - 2)$. And $a - 6 = 4 \cdot (p - 6)$. From the first equation, $a = 2p - 2$. substitute it into the second equation. Then $2p - 2 - 6 = 4p - 24$. So, $p = 8$ and $a = 14$. Therefore, the sum of their current ages = $8+14 = 22$.

10. C)

Set up an equation based on description. The maximum height after bouncing once is half the initial height. So, $\frac{1}{3}x + 2 = \frac{1}{2}x$, where x is the initial height. $\frac{1}{6}x = 2$. So, $x = 12$

11. D)

To find the y-intercept, set $x = 0$ into the equation. $y = 2(2a)^1 - a = 3a$.

12. 12
Set up an equation. $32.05 = 3.25 + 0.60(4x)$, where x is the number of miles driven. Now, solve for x . then $x = 12$ miles. Note: $4x$ means how many quarter miles driven in x miles.
13. D)
Use the answer choices to find the answer. The process of elimination. Only D) $(-3, 0)$ works for both inequalities.
14. A)
Let's find the radius for all portions. Since $r_c = 3r_a$, $r_c = 3 \times 2 = 6 \text{ mm}$. $r_b = \frac{1}{2}r_c = \frac{1}{2} \times 6 = 3 \text{ mm}$. So the fraction of the white portion in volume is $\frac{\pi(3^2 - 2^2) \cdot 6}{\pi 6^2 \cdot 6} = \frac{5}{36}$.
15. 2
The median number is the middle number (the 4th number out of 7 numbers) when you put them in order. So, the median number of Calculus class is 10 and the median number of Physics class is 8. Therefore, the median in calculus class exceeds the median in physics class by 2.
16. C)
Using two x-intercepts, you can write $y = (x - 2)(x + 4) = x^2 + 2x - 8$. Now compare it with the given equation. Then you get $a = 2$ and $b = -8$. Therefore, $a + b = -6$.
17. C)
First, divide the given equation by -3. $x^2 - 2x + y^2 + y = -\frac{1}{3}$. To complete the square, add $\left(\frac{b}{2}\right)^2$ for both x and y .
 $x^2 - 2x + 1 + y^2 + y + \frac{1}{4} = -\frac{1}{3} + 1 + \frac{1}{4}$. Then, you get $(x - 1)^2 + \left(y + \frac{1}{2}\right)^2 = \frac{11}{12}$. The coordinates of the center of the circle is $\left(1, -\frac{1}{2}\right)$.
18. B)
The slope of line l is $\frac{2}{3}$. So, the slope of the perpendicular line is $-\frac{3}{2}$. So, $y = -\frac{3}{2}x + b$. If you change this into the standard form of a line, you get $3x + 2y = 2b$.
19. B)
This graph could be a misleading graph because the x axis doesn't start from 0. You can choose two obvious points (160, 250) and (190, 270). The slope is $\frac{270 - 250}{190 - 160} = \frac{20}{30} = \frac{2}{3} \approx 0.67$. so the equation would be $y = 0.67x + b$. Plug in (160, 250). Then $b \approx 143$.
20. 2
 $(2ax + 3)(x - 1) - x^2 + 3 = (2a - 1)x^2 + (3 - 2a)x$. This result must be equivalent to mx .
By comparing them, you can set up $2a - 1 = 0$ and $3 - 2a = m$. Thus, $a = \frac{1}{2}$ and $m = 2$.
21. A)
 x = the mean score for class A and y = the mean score for class B. so, you can set up an equation $x \leq y - 20$. Or $y \geq x + 20$.
22. A)
Write an equation based on the description. $123.14 = k + 0.07 \times x$, where x is the number of kilowatt-hours of electricity used on that month. now solve for x .
 $x = \frac{123.14 - k}{0.07}$.

Answers and explanations for Test 8 (Module 2)

1. C)

To prove two triangles are congruent. We have 5 ways to prove. SSS, SAS, ASA, AAS, HL. I is false because we can't apply any of 5 ways. II is true because of AAS. III is also true because of ASA.

2. C)

To find y-intercept, set $x=0$ and solve for y . $y = ab^0 + k = a + k$. Thus, the coordinates of y-intercept is $(0, a + k)$.

3. B)

Let's plug the changes into the given formula. $2\pi \sqrt{\frac{2l}{g}} = 2\pi \sqrt{\frac{4l}{g}} = 4\pi \sqrt{\frac{l}{g}} = 2T$. Thus, T will be doubled.

4. C)

The mean = $\frac{10 \times 2 + 12 \times 3 + 18 + 22 \times 4 + 25 \times 7}{17} = 19.8235$. The median is the 9th number from the smallest. So, the median = 22. Therefore, the median is greater than the mean.

5. A)

Notice that x and y values stand for the number of tickets for either music concert or play in theater. For y-intercept $(0, 8)$, $240 \div 8 = \$30$ for each ticket (fixed amount). And similarly for x-intercept $(12, 0)$, $240 \div 12 = \$20$ for each ticket (fixed amount). So, you can eliminate C) and D). now, plug in $(0, 8)$ to see which one works. So, A) works for both x and y intercepts.

6. D)

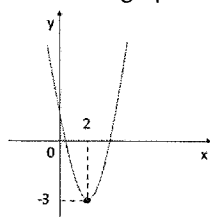
From the left side of the equation, $\left(\frac{1}{a}\right)^{x^2+2x-1} = a^{-x^2-2x+1}$. This should be equal to a^{-2} . So, you can set up an equation $-x^2 - 2x + 1 = -2$. Rewrite it. $x^2 + 2x - 3 = 0$. And solve for x. $x = -3$ or $x = 1$. So, sum of x-values is -2.

7. A)

From the bar graph, the adults' percent for meat-lovers favorite is $\frac{90}{90+40+20} \times 100 = 60\%$. And the children's percent for meat-lovers favorite is $\frac{50}{50+20+80} \times 100 = 33.3$ or $\frac{100}{3}\%$. therefore, the ratio is $60:\frac{100}{3} = 180:100 = 9:5$.

8. A)

Sketch the graph of a parabola based on the given information.

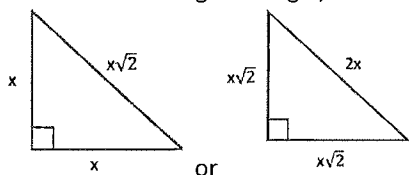


The graph on the left is one possible graph of the quadratic function. Since the vertex is located at $(2, -3)$ and the function has two zeros, the graph should be opened up. Now, when $x=1$ and plug $x=1$ into the function, you get $y = a + b + c$ which means the value of $a + b + c$ will be the value of y coordinate of the function when $x=1$. So, A)-3 is not possible y-coordinate when $x=0$.

9. A)
Solve the system of equations. Divide the second equation by 5. Then $-3y = x + 7$ or $x + 3y = -7$. So, you get the same equation as the first one. It means that the system has infinitely many solutions or you can write the solution set as $(k, \frac{k+7}{-3})$ or $(3k + 7, k)$, where k is a real number. Therefore, the answer is A).

10. B)
Because the quadratic equation has two real solutions, the discriminant must be greater than zero. $(16)^2 - 4(-k) > 0$. So, $k > -64$. We know $k > m$. So, the greatest value of m should be -64 .

11. C)
For an isosceles right triangle, the ratio of the sides is as shown in the figure below.

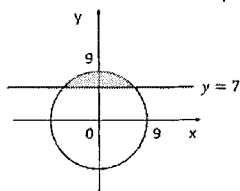


Thus, the perimeter is in the form of either $2x + x\sqrt{2}$ or $2x\sqrt{2} + 2x$. Since the given perimeter is $16 + 16\sqrt{2}$, comparing it to the second expression, we know that $x=8$. Therefore, the length of a leg of the triangle is $8\sqrt{2}$.

12. B)
The following height will be $\frac{2}{3}$ its previous height. So, after 1st bounce, the height will be $\frac{2}{3} \times 15 = 10m$. And after 2nd bounce, $\frac{2}{3} \times 10 = 6.7m$.

13. C)
The most reasonable explanation for the result of the study is C). We cannot conclude "cause-and-effect" between turmeric use and type 2 diabetes because the result might come from other foods or medication they took and also we cannot project the same result to women.

14. D)
Let's draw both inequalities in the XY-plane.



The shaded region of the graphs is the solution of the inequalities. To find the least x -value of the shaded region, find the intersection of two graphs. From the second equation. $y = 7$. Plug that y -value into the first equation. Then, $x^2 + 49 = 81$. You get $y = \pm 4\sqrt{2}$. Therefore, the minimum x -value is $-4\sqrt{2}$.

15. A)
In the description of the model, x means that the unit price, in dollars, of the products. Thus, 1,200 means that the company could make a maximum annual revenue 20 million dollars if the unit price is \$1,200.

16. B)
Distance = rate \times time. The number 505 is the average speed, in mph, of the airplane for the entire trip from JFK to LAX. Thus, $2,777 - 505t$ shows how many miles left after t hours of flying from JFK.

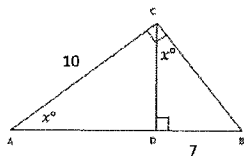
17. D)

The population of bees in the hive quadruples every week. Because one month has four weeks, you can set up an equation as $12 \cdot (4)^{4x}$, where x is the number of months after the beginning of his observation.

18. C)

The amount of harvest this year: $60,000 \cdot 1.20 = 72,000$. And the amount of harvest next year would be $72,000 \cdot 1.20 = 86,400$ pounds.

19. C)



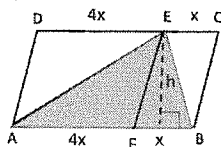
Triangle ABC and triangle CBD are similar because of AA similarity (right angle and angle B). so, the angle BCD is also x° . In triangle CBD, $\sin x^\circ = \frac{BD}{BC}$. Substitute all values we know. Then, $0.75 = \frac{7}{BC}$. Therefore, $BC = 9.33$.

20. A)

Unit conversion. Use dimensional analysis.

$$1.2 \frac{\text{acre}}{\text{year}} \times \frac{1 \text{ mile}^2}{640 \text{ acre}} \times \frac{1 \text{ km}^2}{0.62^2 \text{ mile}^2} = 0.0049 \frac{\text{km}^2}{\text{year}}$$

21. B)



The area of triangle ABE is the sum of the area of triangle AFE and the area of triangle BFE. So, $20 = \frac{1}{2}(4x)(h) + \frac{1}{2}(x)(h)$. So, we get $xh = 8$ and we know that the area of triangle BCE is the same area of triangle BFE. So, $\frac{1}{2}(x)(h) = \frac{1}{2}(8) = 4$.

22. C)

Average amount of money each customer spent can't be calculated because we don't know how much individual spent actually. I is false. The median amount of money out of 181 customers will be 91st one. But we don't know the exact amount of money for the 91st customer spent. We just know the amount of money spent for 91st customer is between 100-200. II is false. We know that the range of money spent by more than half of all customers because 134 customers used the money between 100-200 dollars. So, III is true.