

TEST SET 11- ANSWER KEYS AND SCORE CONVERSION TABLE

Module 1	1	2	3	4	5	6	7	8	9	10	11
	B	17	B	C	C	B	B	87.4	B	B	C
	12	13	14	15	16	17	18	19	20	21	22
	C	A	C	18	3/2	72	C	A	D	A	A
Module 2	1	2	3	4	5	6	7	8	9	10	11
	C	A	C	7	D	B	A	B	D	D	C
	12	13	14	15	16	17	18	19	20	21	22
	D	A	18	C	D	B	B	1	60	A	D

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 11 (Module 1)

1. B)

Because two triangles are similar, we know that all corresponding angles of two similar triangles are congruent. So, $\sin \angle R = \sin \angle C$. And $\cos \angle B = \sin \angle C$ (co-functions) since $\angle B$ and $\angle C$ are complementary angles. Therefore, $\sin \angle R = \frac{5}{13}$ using transitive property because of $\cos \angle B = \frac{5}{13}$.

2. 17

Let's x and y are two positive integers. $xy = 204$ and $x = y - 5$. Substitute the second equation into the first equation. Then, $y(y - 5) = 204$. Rewrite the equation as the standard form. $y^2 - 5y - 204 = 0$. Now, Factor it. $(y - 17)(y + 12) = 0$. So, $y = 17$ (positive number). And $x = 17 - 5 = 12$. Therefore, the greater number is 17.

3. B)

Let x is the regular price of a headphone. Because the sales tax is 9% of the regular price, we can set up $12.50 = 0.09 \times x$. so, $x = 138.89$. The sales price = $138.89(1 - .35) + 12.50 = \102.78 .

4. C)

Plug in the answer choices from the largest value. And D) 4 works for the given equation. Then, you can stop checking the rest. It must be the largest solutions to the equation.

5. C)

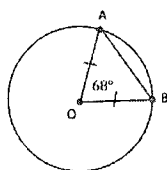
Density = $\frac{\text{mass}}{\text{volume}}$. Since the volume of cube is $1\text{m}^3 = 100^3\text{cm}^3$, you can set up $\frac{2.7\text{g}}{\text{cm}^3} \times 100^3\text{cm}^3 \times \frac{1\text{kg}}{1,000\text{g}}$ will give you the mass, in kg, of the sample of granite.

6. B)

The circle equation is $(x - h)^2 + (y - k)^2 = r^2$, where the center is at (h, k) and the radius of the circle is r . so, $(x - 1)^2 + (y + 3)^2 = r^2$. Now, plug in the point $(0, 0)$ into the equation. Then you get $r^2 = 10$.

7. B)

Draw the circle and mark the given angles.



$\overline{OA} \cong \overline{OB}$ because all radii are congruent in the same circle. Thus, the triangle OAB is an isosceles triangle. So $m\angle OAB = \frac{1}{2}(180 - 68) = 56^\circ$

8. 87.4

The mean score of the combined classes = $\frac{\text{The sum of scores for both classes}}{\text{The total number of students}} = \frac{65 \times 83 + 38 \times 95}{65 + 38} = 87.4$.

9. B)

The quadratic form that shows y-intercept as a constant in the equation is the standard form. In B) $y = -x^2 + x + 6$, the constant 6 is the y-intercept in the equation.

10. B)

Let's find out the time to reach the maximum height. So, it would be the x-coordinate of the vertex of the parabola.
 $x = -\frac{b}{2a} = -\frac{14.7}{2(-4.9)} = 1.5$. using the symmetry about the vertex, we know that the time took from the maximum height to the ground is the same as the time took from the ground to the maximum height.

11. C)

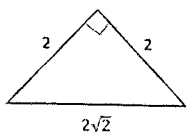
The remainder theorem says when the polynomial function $P(x)$ is divided by $x-a$, the remainder will be $P(a)$. therefore, the given $P(3) = -7$ means that the remainder is -7 when $P(x)$ is divided by $x - 3$.

12. C)

Let's find the mean value of the number of clam shells in the 10 regions chosen. $\frac{22+18+19+25+15+3+27+18+22+26}{10} = 19.5$. Since the mean value of the number of clam shells in the research regions are 19.5 clam shells per $1ft^2$ and the entire area for their research in the mudflats is $100ft^2$, you can multiply the mean value by 100 to get the reasonable approximate number of clam shells. So, it will be 1,950.

13. A)

Let's draw the diagram.



In the diagram on the left, the length of a leg is 2 using Pythagorean triple $x - x - \sqrt{2}x$. Therefore, the area of the right triangle is $\frac{1}{2}(2)(2) = 2$.

14. C)

The median and the mean value of both data set A and B must be same because both data sets are symmetrical based on the center value at 8. I is true and II is false. As for the standard deviation, the more clustered to the mean value, the less the standard deviation value the data should have. Therefore, data set A has a larger standard deviation than data set B. III is true.

15. 18

Use the fundamental theorem of algebra. The product of roots is $\frac{c}{a}$ in the quadratic equation $ax^2 + bx + c = 0$. You can set up an equation $\frac{k}{1} = (5 + \sqrt{7})(5 - \sqrt{7})$. Thus, $k = 25 - 7 = 18$.

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

If the system of linear equations has no solutions, their slopes must be equal. So, change the system into the slope intercept forms. The first equation will be $y = -\frac{2}{p}x - \frac{1}{3p}$ and the second equation will be $y = -\frac{4}{3}x + 7$. Set the slopes equal to each other. $-\frac{2}{p} = -\frac{4}{3}$. So, $p = \frac{3}{2}$.

17. 72

Unit change from radian to degrees. $\frac{2}{5}\pi \times \frac{180^\circ}{\pi} = 72^\circ$.

18. C)

Since x represents the number of instructors and y represents the number of students, $x + y \leq 120$ (The maximum capacity) and $5x \geq y$ because each instructor will lead less than or equal to 5 students.

19. A)

To find the y-intercept of the exponential equation, substitute $x = 0$ and solve for y . $y = k(2)^{\frac{0}{3}} - l = k - l$. Therefore, y-intercept is $(0, k - l)$.

20. D)

The average rate of change is the slope of two points $(2000, 67)$ and $(2002, 103)$.

$\frac{103-67}{2002-2000} = 18$. So, 18 more registration per year for the Zumba program.

21. A)

You can set up an equation based on the description. $f(x) = 3.3x$. So, it is a linear equation and increasing because of the positive slope.

22. A)

Change the given linear equation into the slope intercept form. $y = \frac{2}{7}x - \frac{3}{7}$. Now, translate 3 units up. Then, $y = \frac{2}{7}x - \frac{3}{7} + 3$. Thus, $y = \frac{2}{7}x + \frac{18}{7}$. And plug in $y=0$ and solve for x . $0 = \frac{2}{7}x + \frac{18}{7}$. Therefore, $x = -9$.

Answers and explanations for Test 11 (Module 2)

1. C)
When plug in $t = 0$, $f(0) = 125$. It means that Adrian had \$125 in his piggy bank before he started to deposit some fixed amount of money monthly.
2. A)
The amount money she paid was \$145 after 20% off for 5 shower curtains. So, let's define x as the original price of one shower curtain. Then, $5x(1 - 0.20) = 145$. Now, solve for x . therefore, $x = \$36.25$.
3. C)
To prove two triangles are similar, we have three ways. SSS, SAS, AA. Since $\angle A \cong \angle V$. $\angle C \cong \angle R$ will be sufficient to prove (AA) and also $\frac{\overline{AC}}{\overline{VR}} = \frac{\overline{AB}}{\overline{VW}}$ will be sufficient (SAS).
4. 7
Plug in $w = 6$ into the given equation. $30m + 45(6) = 480$. Solve for m . $m = 7$.
5. D)
The ratio of the height to its base is 3:5 or $\frac{3}{5}$. So, you can set up an equation. $\frac{3}{5} = \frac{3x+9}{5x+m}$. Cross-multiply and solve for m . $m = 15$.
6. B)
Let's set up equations based on information. $r_A = k$ and $2\pi r_B = 10\pi + 2\pi r_A$. Substitute r_A into the second equation. $2\pi r_B = 10\pi + 2\pi k$. Solve for r_B . Then, $r_B = 5 + k$. The function h is the area of circle B. $h = \pi(r_B)^2 = \pi(5 + k)^2$.
7. A)
The function $g(x)$ represents the value of a certain stock at the end of the year x years after purchase. Therefore, $g(3)=2,179.02$ means the value of the stock at the end of 2003 will be approximately \$2,179.02.
8. B)
Solve for w from the given equation $2\sqrt{3+p} = \frac{4x+w}{3w}$. Cross-multiply and collect like-terms.
 $6w\sqrt{3+p} = 4x + w$. And $w = \frac{4x}{6\sqrt{3+p}-1}$.
9. D)
Let's square each length. $(2\sqrt{3})^2 = 12$, $(6\sqrt{2})^2 = 72$, and $(2\sqrt{21})^2 = 84$. Now, we know $12 + 72 = 84$. it means that the triangle is a right triangle because it satisfies the Pythagorean theorem and two legs are $2\sqrt{3}$ and $6\sqrt{2}$. Therefore, the area of the triangle is $\frac{1}{2}(2\sqrt{3})(6\sqrt{2}) = 6\sqrt{6}$.
10. D)
We know that $5x^2 + ax - 68 = (mx + k)(x + l)$, where m , k , and l are integers. When you expand the right side of the equation, kl must be equal to -68 for the constant term. Therefore, $\frac{68}{l}$ must be an integer.
11. C)
The measure of an arc is the same angle as the central angle. Thus, the measure of arc AB is 30° . So, change this into radian angle. $30^\circ \times \frac{\pi}{180^\circ} = \frac{\pi}{6}$.

12. D)

Let's simplify the given expression. $8\sqrt[3]{27x^{81}} \cdot \sqrt[7]{2^{14}x^{21}} = 8 \cdot (27)^{\frac{1}{3}} \cdot (x^{81})^{\frac{1}{3}} \cdot (2^{14})^{\frac{1}{7}} \cdot (x^{21})^{\frac{1}{7}} = 8 \cdot 3 \cdot x^{27} \cdot 4 \cdot x^3 = 96x^{30}$. Now, this should be equivalent to kx^m . You get $k = 96$ and $m = 30$ by comparing them. Therefore, $\frac{k}{m} = \frac{96}{30} = \frac{16}{5}$.

13. A)

Substitute the second equation into the first one. Then, $3x^2 - x - 2 = 2x - k$. Collect like-terms. $3x^2 - 3x - 2 + k = 0$. For a quadratic equation to have a one solution, the discriminant should be equal to zero. $b^2 - 4ac = (-3)^2 - 4(3)(-2 + k) = 0$. therefore, $k = \frac{11}{4}$.

14. 18

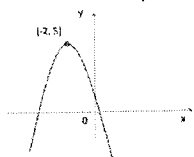
An isosceles right triangle has a Pythagorean triple of $x - x - \sqrt{2}x$ as the ratio of sides. Since the length of the hypotenuse is $6\sqrt{2}$, that should be equivalent to $\sqrt{2}x$. So, $x = 6$. The area of the triangle is $\frac{1}{2}(6)(6) = 18$.

15. C)

For a rational expression to be undefined, the denominator should be equal to zero. $(x - 1)(x + 2) = 0$. Therefore, $x = 1$ or $x = -2$.

16. D)

Let's draw a possible graph of parabola.



Because the parabola intersects the x-axis twice, the parabola must open downward. The value of $a + b + c$ is the value of y when $x = 1$. Since the parabola opens downward, the value of y must be smaller than 5. Only D) 0 is satisfied this condition.

17. B)

If the estimated proportion of the population for a certain characteristic is 0.78 and the associated margin of error is 0.02, you can conclude that it is plausible that the proportion of the population for the characteristic is between 0.76 and 0.80.

18. B)

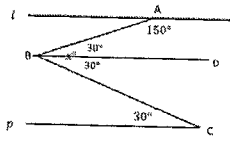
The total weight of the truck with loads = $1,200 + 150x$, where x is the number of cargo container. So, we can set up inequality, $1,200 + 150x \leq 5,000$. Solve for x . $x \leq 25.3$. you will have to round down to meet the safety requirement of weight. The maximum number of cargo container is 25.

19. 1

Let's factor the given polynomial $2x^3 + 13x^2 - 7x = x(2x - 1)(x + 7)$. So, $2x - 1 = 2x + k$. Therefore, $k = -1$. The absolute value of k is 1.

20. 60

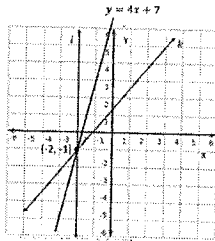
Crooke's problem. Draw an additional parallel line between lines p and l .



In two parallel lines cut by a transversal, the same side interior angles are supplementary and also the alternate interior angles are congruent. Therefore, $x = 30^\circ + 30^\circ = 60^\circ$.

21. A)

For the system of three equations, three lines must meet at one point to have a solution. The new equation $y = 4x + 7$ is also drawn in the XY-plane below.



The new line also passes through the point $(-2, -1)$. It is the solution to the system of three equations.

22. D)

The median is 4 (9th number from the least) before the number 14 is added and the new median is 5 (the average of 9th and 10th numbers) after the number 14 is added. I is false. The mode 2 won't change after the number 14 is added. II is true. The range will be 12 from 10 after the number 14 is added to the data set. So, III is false.