Tennessee Comprehensive Assessment Program

TCAP

Integrated Math III
Practice Test

Please* PRINT *all information in the box.

Student Name: _____

Teacher Name: _____

School: _____

District: _____

All practice test items represent the appropriate grade level/content standards—however, the practice test may contain item types that no longer appear on the operational assessment.

TNReady Math Reference Sheet—High School

1 inch = 2.54 centimeters
1 mile = 5,280 feet
1 mile = 1,760 yards
1 mile = 1.609 kilometers
1 kilometer = 0.62 mile
1 meter = 39.37 inches

1 pound = 16 ounces
1 pound = 0.454 kilograms
1 kilogram = 2.2 pounds
1 ton = 2,000 pounds

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 gallon = 3.785 liters
1 liter = 0.264 gallons
1 liter = 1,000 cubic centimeters

Exponential Growth: $y = a(1 + r)^t$

Exponential Decay: $y = a(1 - r)^t$

Compound Interest: $A = P\left(1 + \frac{r}{n}\right)^{nt}$

Continually Compounding Interest: $A = Pe^{rt}$

Arithmetic Sequence: $a_n = a_1 + (n - 1)d$

Geometric Sequence: $a_n = a_1(r)^{n-1}$

Finite Geometric Series: $S_n = \frac{a_1\left(1 - r^n\right)}{1 - r}$

Degrees: 1 degree = $\frac{\pi}{180}$ radians

Radians: 1 radian = $\frac{180}{\pi}$ degrees

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Directions

This test has Subpart 1, Subpart 2, and Subpart 3. Each subpart contains various types of assessment questions.

You MAY NOT use a calculator in Subpart 1 of this test.

Sample: Multiple choice (one correct response)

Event G and Event H are independent. The probability that event G will occur is 0.3; the probability that event H will occur is 0.7.

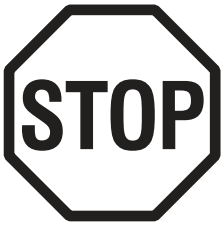
What is the probability of G given H?

A. 0.21

B. 0.3

C. 0.4

D. 0.7



Do not go on to the next page until told to do so.

1 What is the remainder when $f(x) = x^3 + 3x^2 - 10x - 14$ is divided by $(x - 3)$?

Enter your answer in the space provided.

2 What value of x makes the equation $\frac{3}{x+3} = \frac{9}{x^2-9}$ true?

Enter your answer in the space provided.

3 Select **two** expressions that are equivalent to $\left(\left(\frac{1}{4}\right)^2\right)^{4x}$.

A. $\left(\frac{1}{4}\right)^{4x}$

B. $\left(\frac{1}{16}\right)^{4x}$

C. $\left(\frac{1}{4}\right)^{6x}$

D. $\left(\frac{1}{4}\right)^{8x}$

E. $\left(\frac{1}{16}\right)^{8x}$

4 Consider the function $f(x) = 3x^2 + 4$ on the domain $[0, \infty]$.

What is the inverse of $f(x)$?

M. $f^{-1}(x) = \sqrt{\dfrac{x-3}{4}}$

P. $f^{-1}(x) = \sqrt{\dfrac{x-4}{3}}$

R. $f^{-1}(x) = \sqrt{\dfrac{x}{3}} - 4$

S. $f^{-1}(x) = \sqrt{\dfrac{x}{4}} - 3$

5 If the denominator does not equal 0, which expression is equivalent to $\dfrac{x^2 - 4x - 5}{x^2 - 9x + 20}$?

A. $\dfrac{x-1}{x-4}$

B. $\dfrac{x-1}{x+4}$

C. $\dfrac{x+1}{x-4}$

D. $\dfrac{x+1}{x+4}$

6 Shanika is making a decorative tablecloth for her small circular table. The table has a radius of 40 centimeters and height of 60 centimeters. She wants the tablecloth to hang an even 10 centimeters above the ground.

Which design would give Shanika what she wants?

M. a circular piece of cloth with a radius of 90 cm

P. a circular piece of cloth with a radius of 100 cm

R. a circular piece of cloth with a radius of 110 cm

S. a circular piece of cloth with a radius of 130 cm

7 What is the equation of the circle with a diameter of 6 units and a center located at $(2, -5)$ on the coordinate plane?

A. $(x + 2)^2 + (y - 5)^2 = 36$

B. $(x - 2)^2 + (y + 5)^2 = 36$

C. $(x + 2)^2 + (y - 5)^2 = 9$

D. $(x - 2)^2 + (y + 5)^2 = 9$

This is the end of Subpart 1 of the Integrated Math III Test.
Do not go on to the next page until told to do so.

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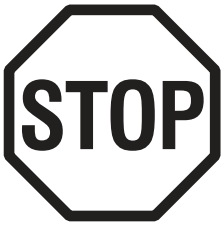
Directions

Subpart 2 of this test contains various types of assessment questions.

You MAY use a calculator in Subpart 2 of this test.



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8 What is sin θ if θ is an angle in the third quadrant and tan $\theta = 1$?

A. $\frac{\sqrt{2}}{2}$

B. $-\frac{\sqrt{2}}{2}$

C. $\frac{1}{2}$

D. $-\frac{1}{2}$

9 The function $f(x)$ is given by the equation $f(x) = 3(x^2+2)$. The values for the quadratic function $h(x)$ are shown in the table.

x	−2	−1	0	1	2
$h(x)$	6	−3	−6	−3	6

Which statement about the y-intercept of $f(x)$ is true?

M. It is 12 units above the y-intercept of $h(x)$.

P. It is 8 units above the y-intercept of $h(x)$.

R. It is 6 units above the y-intercept of $h(x)$.

S. It is 4 units above the y-intercept of $h(x)$.

10 Quadrilateral *LMNO* has coordinates *L*(5, 6), *M*(9, 8), *N*(11, 12), and *O*(7, 10).

How can quadrilateral *LMNO* be classified?

A. square

B. rhombus but not a square

C. rectangle but not a square

D. parallelogram but neither a rhombus nor a rectangle

11 A sample for a sociologist's study is composed of people who were chosen randomly from shoppers at five different malls in a city.

Which population does this group of people **most likely** represent?

M. residents of the city who live near the mall

P. residents of the state who live near the mall

R. residents of the city who like to shop at malls

S. residents of the state who like to shop at malls

12 A system of equations is shown.

$$f(x) = -x^2 + 6x - 4$$

$$g(x) = |x - 3| - 1$$

What is the greatest value of x for which $f(x) = g(x)$?

Enter your answer in the space provided.

13 A researcher wants to determine if the behavior of children is affected by playing video games that have violent content. He asks the parents of 100 children in a day care center how often each child plays video games and whether the video games they play have violent content. The children are then allowed to play in a controlled environment, such as the day care center's playground. Any violent behaviors are then noted.

What type of study is the researcher conducting?

A. census

B. experiment

C. observational study

D. sample survey

14 Is $(x + 2)$ a factor of $x^3 - x^2 - x - 2$?

M. Yes, the remainder is -12.

P. No, the remainder is 0.

R. No, the remainder is -12.

S. Yes, the remainder is 0.

15 Rewrite to find an equivalent polynomial expression of

$$\frac{24x^4 - 72x^3 + 54x^2 - 12x}{x - 2} \text{ where } x \neq 2.$$

Enter your answer in the space provided.

16 Marcus is starting a new business selling T-shirts. His goal is to sell a total of 15,000 T-shirts during the first 6 months. He projects that the number of T-shirts he sells will increase by 20% each month.

Based on this projection, which of the following is closest to the number of T-shirts Marcus needs to sell during the first month to meet his goal?

A. 1,500

B. 2,000

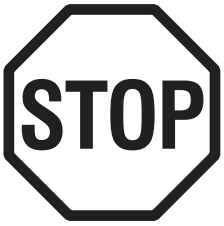
C. 2,500

D. 3,000

17 Alice is half as old as Leo. Leo is 3 years younger than Samara.

Write an equation that gives Samara's age, S, in terms of Alice's age, A.

Enter your answer in the space provided.



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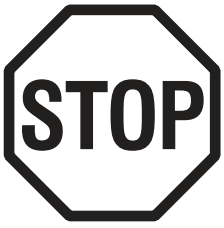
Directions

Subpart 3 of this test contains various types of assessment questions.

You MAY use a calculator in Subpart 3 of this test.



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18 Calvin purchases a piece of heavy machinery for $32,300. The value of the machine depreciates at an annual rate of 8.3%.

Which function represents the value of the machine with an approximate equivalent monthly depreciation rate?

A. $f(t) = 32{,}300\left(0.917^{\frac{1}{12}}\right)^{t}$

B. $f(t) = 32{,}300\left(1.083^{\frac{1}{12}}\right)^{t}$

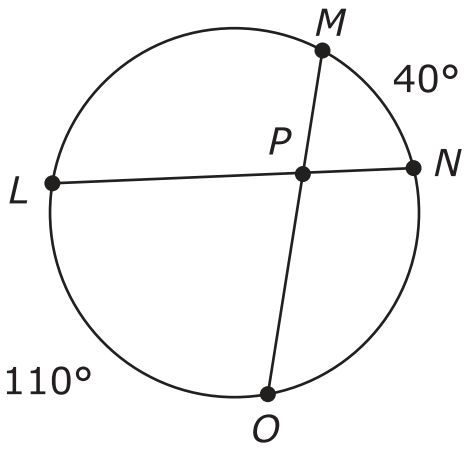
C. $f(t) = 32{,}300\left(0.917^{\frac{1}{12}}\right)^{12t}$

D. $f(t) = 32{,}300\left(1.083^{\frac{1}{12}}\right)^{12t}$

19 What value of t, to the nearest hundredth, makes the equation $4(10)^{3t} = 12$ true?

Enter your answer in the space provided.

20 The two chords shown in the circle intercept the given arcs.



What is the measure of $\angle MPN$?

M. 70°

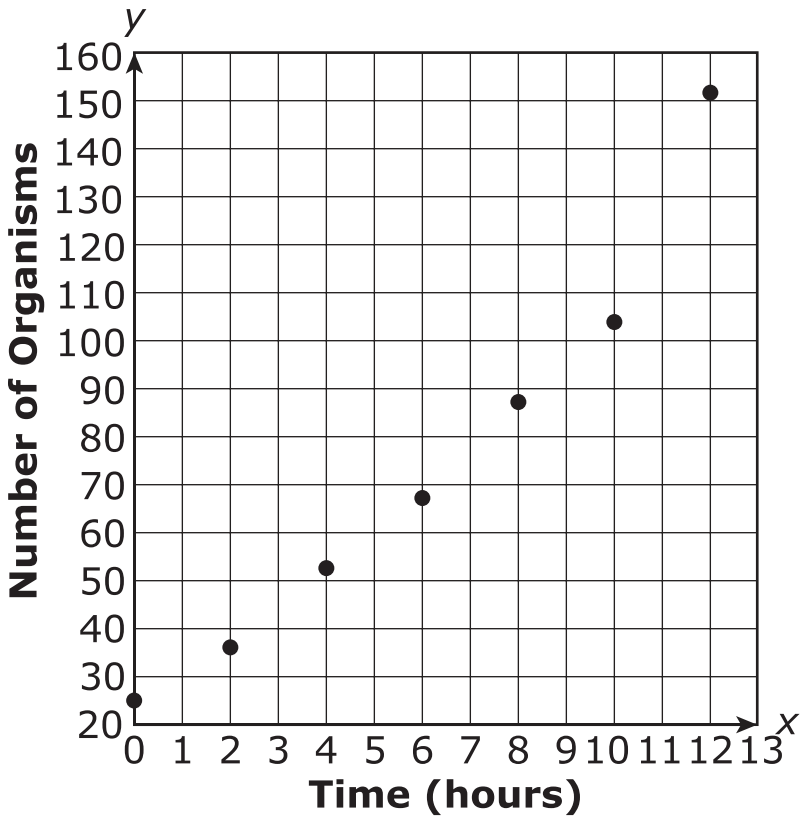
P. 75°

R. 115°

S. 150°

21 The graph shows the exponential growth of the number of organisms in a Petri dish over a 12-hour period.

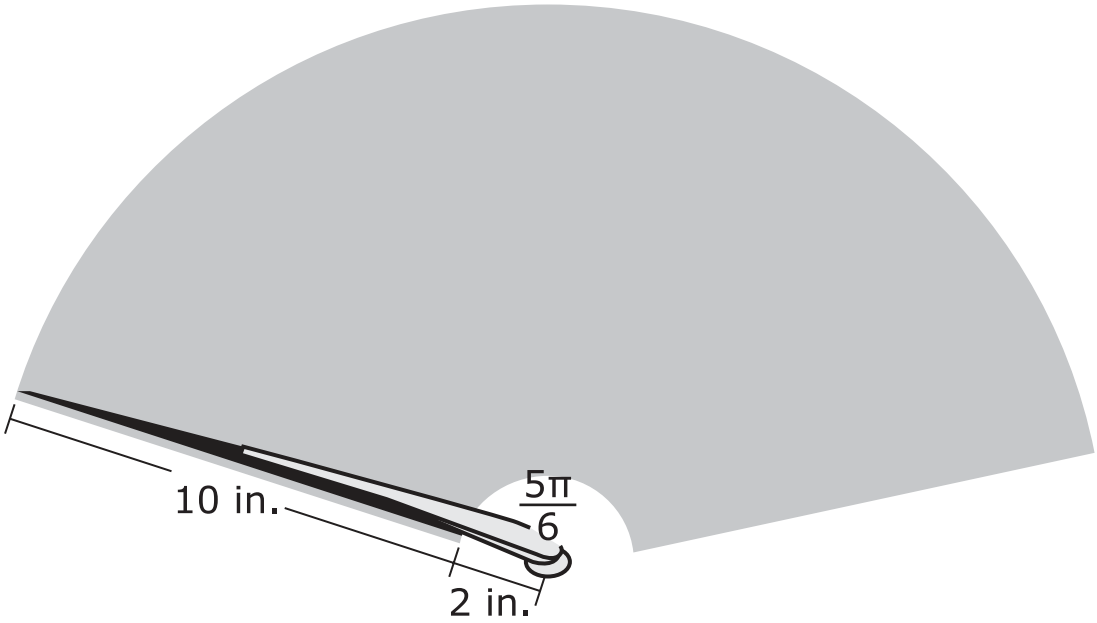
Time (hours)	Number of Organisms
0	25
2	36
4	52
6	68
8	88
10	104
12	151



To the nearest whole organism, how many organisms are expected to be in the Petri dish at 15 hours?

Enter your answer in the space provided.

22 The windshield wiper of a car rotates through an angle of measure $\frac{5\pi}{6}$ radians, as shown.



The shaded section of the diagram represents the area cleared by the 10-inch blade of the windshield wiper as it moves from one side to the other.

Approximately what is the area cleared by the blade of the windshield wiper?

A. 125 in^2

B. 183 in^2

C. 367 in^2

D. 790 in^2

23 The difference of cubes identity will be used to determine the difference between 216 and 64.

- $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
- $216 - 64 = (2)(36 + 24 + 16)$

What values of a and b should be used?

Select the **two** that apply.

M. $a = 6$

P. $a = 10$

R. $a = 18$

S. $b = 4$

T. $b = 8$

V. $b = 16$

24 A county employee is making plans for some changes in and around a triangular section of a park. To begin, he plotted the three vertices of triangle *ABC* on a coordinate plane.

- The triangle has vertices located at $A(0, 0)$, $B(1, 4)$, and $C(4, 1)$.
- Each unit on the coordinate plane is equivalent to 100 yards in the park.

The employee is planning to place a circle of trees around the triangular section of the park.

Which method should he use to determine the center of that circle?

A. Find the intersection of the bisectors of each angle of the triangle.

B. Find the intersection of the perpendicular bisectors of each side of the triangle.

C. Find the intersection of the altitudes drawn from each side of the triangle to the opposite vertex.

D. Find the intersection of the line segments drawn from the median of each side of the triangle to the opposite vertex.

25 The table shows the daily account balance of a checking account.

Account Balance of a Checking Account

Day	1	2	3	4	5
Account Balance (in dollars)	355.75	325.16	317.22	280.68	154.37

What value is closest to the average rate change in the account balance from Day 1 to Day 4?

M. −$15.30

P. −$25.02

R. −$44.72

S. −$50.35

26 The graphs of functions $f(x) = 3^{(2x + 1)} - 4$ and $g(x) = e^{(2.2x)}$ intersect at a point.

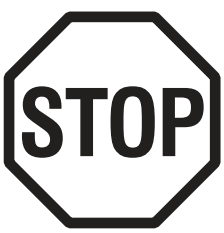
What is the y-coordinate of the point of intersection?

Enter your answer in the space provided.

27 The test scores on a mathematics test in a class are normally distributed with a mean of 82 and a standard deviation of 5. Robert earned a score of 87 on that test.

Approximately what percentage of the class earned a higher score on the test than Robert?

Enter your answer in the space provided.



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Name: _____

Subpart 1 Practice Test Questions

1.

2.

3. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ (select **two**)

4. Ⓜ Ⓟ Ⓡ Ⓢ

5. Ⓐ Ⓑ Ⓒ Ⓓ

6. Ⓜ Ⓟ Ⓡ Ⓢ

7. Ⓐ Ⓑ Ⓒ Ⓓ

Subpart 2 Practice Test Questions

8. Ⓐ Ⓑ Ⓒ Ⓓ

9. Ⓜ Ⓟ Ⓡ Ⓢ

10. Ⓐ Ⓑ Ⓒ Ⓓ

11. Ⓜ Ⓟ Ⓡ Ⓢ

12.

13. Ⓐ Ⓑ Ⓒ Ⓓ

14. Ⓜ Ⓟ Ⓡ Ⓢ

15.

16. Ⓐ Ⓑ Ⓒ Ⓓ

17.

Subpart 3 Practice Test Questions

18. Ⓐ Ⓑ Ⓒ Ⓓ

19.

20. Ⓜ Ⓟ Ⓡ Ⓢ

21.

22. Ⓐ Ⓑ Ⓒ Ⓓ

23. Ⓜ Ⓟ Ⓡ Ⓢ Ⓣ Ⓥ (select **two**)

24. Ⓐ Ⓑ Ⓒ Ⓓ

25. Ⓜ Ⓟ Ⓡ Ⓢ

26.

27.

Subpart 1 Practice Test Questions

1. 10

2. 6

3. Ⓐ ● Ⓒ ● Ⓔ (select **two**)

4. Ⓜ ● Ⓡ Ⓢ

5. Ⓐ Ⓑ ● Ⓓ

6. ● Ⓟ Ⓡ Ⓢ

7. Ⓐ Ⓑ Ⓒ ●

Subpart 2 Practice Test Questions

8. Ⓐ ● Ⓒ Ⓓ

9. ● Ⓟ Ⓡ Ⓢ

10. Ⓐ ● Ⓒ Ⓓ

11. Ⓜ Ⓟ ● Ⓢ

12. 5

13. Ⓐ Ⓑ ● Ⓓ

14. Ⓜ Ⓟ ● Ⓢ

15. $24x^3 - 24x^2 + 6x$

16. ● Ⓑ Ⓒ Ⓓ

17.

$S = 2A + 3$ **or** equivalent

Subpart 3 Practice Test Questions

18. Ⓐ Ⓑ ● Ⓓ

19.

0.16

20. Ⓜ ● Ⓡ Ⓢ

21.

219 to 233

22. Ⓐ ● Ⓒ Ⓓ

23. ● Ⓟ Ⓡ ● Ⓣ Ⓥ (select **two**)

24. Ⓐ ● Ⓒ Ⓓ

25. Ⓜ ● Ⓡ Ⓢ

26.

1.93-2.06

27.

16

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Department of Education

TNReady Practice Test Standards Alignment and Key – Integrated Math III

Subpart 1	Key	Standard
1	10	M3.A.APR.A.1
2	6	M3.A.REI.A.2
3	B, D	M3.A.SSE.A.1
4	P	M3.F.BF.A.2a
5	C	M3.A.SSE.A.1
6	M	M3.G.MG.A.1
7	D	M3.G.GPE.A.1
Subpart 2		
8	B	M3.F.TF.B.3b
9	M	M3.F.IF.B.4
10	B	M3.G.GPE.B.2
11	R	M3.S.IC.A.1
12	5	M3.A.REI.B.3
13	C	M3.S.IC.B.3
14	R	M3.A.APR.A.1
15	$24x^3 - 24x^2 + 6x$	M3.A.APR.C.4
16	A	M3.A.SSE.B.3
17	$S = 2A + 3$ **or** equivalent	M3.A.CED.A.2
Subpart 3		
18	C	M3.A.SSE.B.2a
19	0.16	M3.F.LE.A.2
20	P	M3.G.C.A.2
21	219 to 233	M3.S.ID.B.2a
22	B	M3.G.C.B.4
23	M, S	M3.A.APR.B.3
24	B	M3.G.CO.A.1
25	P	M3.F.IF.A.2
26	Accept any answer from 1.93 to 2.06	M3.A.REI.B.3
27	16	M3.S.ID.A.1

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