

Arcadia University

Sample Placement Exam

Instructions: There are three different sections in the sample math placement inventory: Math Skills, Algebra and Pre-Calculus. You should take two of the three sections. Students who have taken four years of high school math culminating with either calculus, pre-calculus, or math analysis should take the Algebra and Pre-Calculus sections. Students with fewer math courses or who definitely do not intend to take calculus at Arcadia should take the Math Skills and Algebra sections.

Algebra

1. $-4 - (5(-1 + 3) + 2) =$

- a) 4 b) 0 c) -16 d) -24 e) 8

2. If $\frac{1}{5}x = 10$ then $x =$

- a) 2 b) 5 c) 15 d) $\frac{1}{2}$ e) 50

3. $2c + 4(c - d) + 2c =$

- a) $4(2c - d)$ b) $2(4c + d)$ c) $2(c + 2d)$ d) $4(c + d)$ e) $4c$

4. $\sqrt{32x^8y^{16}z^4}$

- a) $16x^2y^4z$ b) $4x^4y^8z^2\sqrt{2}$ c) $16x^8y^{16}z^4$ d) $2x^4y^8z^4$ e) $4x^2y^6z\sqrt{2}$

5. The graph of the equation $2x - 5y + 20 = 0$ crosses the y axis at $y =$

- a) -4 b) 20 c) -20 d) 4 e) -4

6. $(3a^4b^5c)(-2a^2c^3)$

- a) $-6a^8b^5c^3$ b) $-6a^6b^5c^4$ c) $9a^8c^4$ d) $a^6b^6c^3$ e) $6a^6b^5c^4$

7. $3a + 2(a + 4) - 3(a - 4) =$

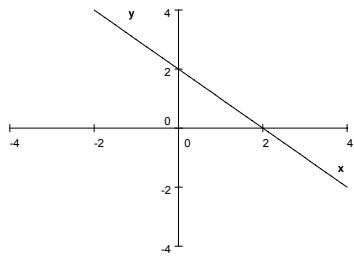
- a) $2a + 20$ b) $a - 11$ c) $5a$ d) $-6a + 11$ e) $2a + 4$

8. $\frac{3}{3 - \frac{1}{5}} =$

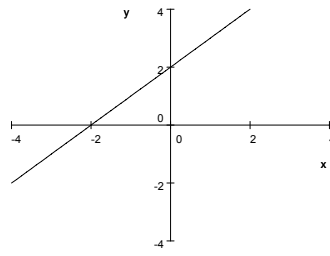
- a) $\frac{-1}{5}$ b) $\frac{5}{3}$ c) $\frac{3}{5}$ d) $\frac{14}{15}$ e) $\frac{15}{14}$

9. Which of the following best represents the graph of $x + y = -2$

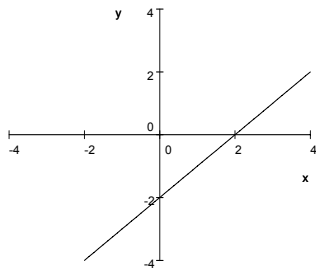
a)



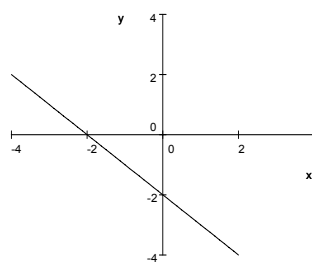
b)



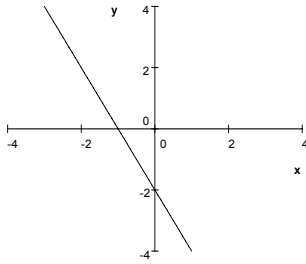
c)



d)



e)



10. $\frac{4a^4b^5 - 8a^3b}{4a^2b} =$

- a) $a^2b^4 - 8a^3b$ b) $4a^4b^5 - 2ab$ c) $a^2b^4 - 2a$ d) $4ab - 2$ e) $-4ab^4$

11. If a taxi cab fare is given by $F = 4m + 5$, where m is miles, what value of m will yield $F = 15$?

- a) 11 b) $2\frac{1}{2}$ c) -1 d) 9 e) $1\frac{1}{4}$

12. Suppose Alice starts out 5 feet tall. Every time she eats a piece of magic cake, her height doubles. Which of the following gives her height after she eats x pieces of cake?

- a) $5 + 2x$ b) $(5 + 2x)^2$ c) $5 \cdot 2x$ d) $2(5^x)$ e) $5(2^x)$

13. $\frac{15}{\sqrt{6}} =$

- a) $\frac{2}{5}$ b) $\sqrt{\frac{5}{2}}$ c) $\sqrt{\frac{2}{5}}$ d) $\frac{\sqrt{6}}{15}$ e) $\frac{5\sqrt{6}}{2}$

14. Find all values of w such that $|-w| = 1$.

- a) 0 b) 1 c) -1 d) -1 and 1 e) 0, 1, -1

15. If $3 + \frac{x}{x-2} = \frac{6}{x-2}$ then $x =$

- a) 3 b) 2 c) -2 d) 6 e) 8

16. $\frac{5x}{x^2-9} \cdot \frac{3x+9}{20} =$

- a) 4 b) 20 c) $\frac{3x}{4(x-3)}$ d) $\frac{3(x-3)}{4}$ e) $\frac{5(x^2+3)}{8}$

17. $\frac{3}{n} + \frac{5}{w} =$

- a) $\frac{15wn}{3w+5n}$ b) $\frac{3w+5n}{nw}$ c) $\frac{3x}{4(x-3)}$ d) $\frac{3(x-3)}{4}$ e) $\frac{5(x^2+3)}{8}$

18. If $x = 8$ then $x^{\frac{-1}{3}} =$

- a) 2 b) $\frac{1}{2}$ c) -2 d) $\frac{-1}{2}$ e) $\frac{1}{512}$

19. The solutions to the equation $3x^2 - 5x - 12 = 0$ are

- a) $3, \frac{4}{3}$ b) $-3, \frac{4}{3}$ c) $-3, \frac{-4}{3}$ d) $3, \frac{4}{7}$ e) $3, \frac{-4}{3}$

20. The inequality $3x - 4 > x + 10$ is equivalent to

- a) $x < -7$ b) $x < 7$ c) $x > \frac{7}{3}$ d) $x > 7$ e) $x > -7$

21. Two pioneer families head out west. The Keller family leaves first and covers 3 miles each day. The Stewart family leaves exactly 10 days later and covers 5 miles each day. After how many more days will the Stewart family catch up to the Keller family? (Count the days from when the Stewarts leave.)

- a) 1 days b) 5 days c) 6.67 days d) 15 days e) none of a-d.

22. In the system of equations $\left\{ \begin{array}{l} 2x + y = 8 \\ x - 3y = 11 \end{array} \right\}$ the value of y is

- a) -2 b) 0 c) 2 d) 4 e) 3

23. The inequality $|8 - x| < 8$ is equivalent to

- a) $0 < x < 16$ b) $x < 1$ c) $-7 < x < 1$ d) $x > 7$ e) $x > 1$

24. Which of the following are factors of $x^4 - 81$?

- I) $x - 3$ II) $x + 3$ III) $x^2 + 9$ IV) $x^2 + 81$

- a) I only b) II only c) I,II,III only

d) I,II only

e) All of the above

25. $(27)^{\frac{1}{3}} \cdot (8)^{\frac{2}{3}} =$

- a) 24 b) 12 c) 6 d) 3 e) 2

26. One of the solutions to this equation $x^2 - 6x = -10$ is

- a) $3 + i$ b) 6 c) 10 d) 4 e) -16

27. $\frac{a}{7b} + \frac{a}{2b} =$

- a) $9ab$ b) $14ab$ c) $\frac{9a}{14b}$ d) $\frac{2a}{9b}$ e) $\frac{a^2}{14b^2}$

28. If $f(x) = \frac{x+5}{x-2}$ then $f(5) =$

- a) $\frac{5}{3}$ b) $\frac{10}{3}$ c) 0 d) $\frac{-5}{3}$ e) 5

29. The inequality $x^2 - 3x < 10$ is equivalent to

- a) $x > 0$ b) $x < -2$ or $x > 5$ c) $x < \frac{10}{3}$
d) $-2 < x < 5$ e) $-5 < x < 2$

30. The graph of the system of equations $\left\{ \begin{array}{l} x + 2y = 4 \\ 3x - y = -9 \end{array} \right\}$ consists of

- a) two lines that intersect at the point $(4, -9)$.
b) two lines that intersect at the point $(6, -2)$.
c) two lines that intersect at the point $(-2, 3)$.
d) two lines that intersect at the point $(3, -2)$.
e) two lines that intersect at the point $(-9, 4)$.

31. If $f(x) = x^2 - 2x + 3$ then $f(x+h) =$

- a) $x^2 - 2x + 3 + h$ b) $(x+h)^2 - 2x + 3$ c) $h^2 - 2h + 3$

d) $(x^2 - 2x + 3) + (h^2 - 2h + 3)$ e) $(x + h)^2 - 2(x + h) + 3$

32. In the Smith family, the length of one's nose is proportional to the length of one's arm. John Smith's nose is 3 inches and his arm is 21 inches long. His brother Henry has a nose which is 2.5 inches. How long is Henry's arm?

- a) 14.0 b) 17.5 c) 18.5 d) 20.5 e) 25.2

Math Skills

1. The boxes with Xs in them represents what fraction of the whole rectangle?

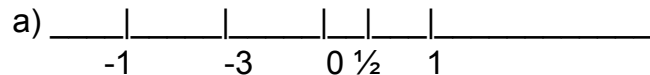
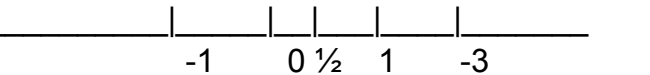
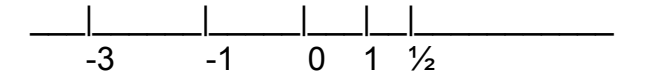
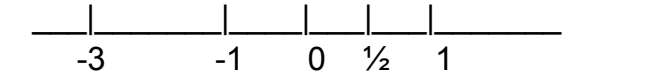
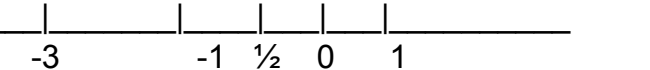
- a) $\frac{1}{5}$ b) $\frac{2}{9}$ c) $\frac{1}{10}$ d) $\frac{8}{9}$ e) $\frac{10}{3}$

X	X				
X	X				

2. The enrollment at CoolMath High School in 1985 was nine hundred fifty four. In 1995 the enrollment was one thousand thirteen. Find the increase in enrollment.

- a) 59 b) 68 c) 69 d) 176 e) 1967

3. On which of the number lines below are -1 , $\frac{1}{2}$, and -3 correctly located?

- a) 
- b) 
- c) 
- d) 
- e) 

4. In a group of 200 students, 10 are from New Jersey. What percent (%) are from New Jersey?

- a) 0.05% b) 5% c) 10% d) 20% e) 50%

5. The area of a triangle is given by the formula $A = \frac{1}{2}bh$ where b is the base and h the height. If a triangle has an area equal to 24 and a height of 4, what is the base?

- a) 2 b) 4 c) 8 d) 12 e) 24

6. The percentage of students of each age at a certain school is given by the table below. If the total number of students in the school is 2000, how many students are 19 or older?

Age	Percentage
17	10%
18	30%
19	20%
20	40%

- a) 120 b) 400 c) 800 d) 1000 e) 1200

7. If the temperature is 3.6 degrees below zero and then rises 7 degrees, what is the new temperature?

- a) 10.6 b) -10.6 c) 3.4 d) -3.4 e) -4.4

8. $9\frac{1}{5} - 4\frac{1}{2} =$

- a) $4\frac{7}{10}$ b) $5\frac{7}{10}$ c) $6\frac{7}{10}$ d) $4\frac{3}{10}$ e) 4

9. Macy's is having a 30% off sale. If an item is originally \$150.00, find the sale price. .

- a) \$45.00 b) \$50.00 c) \$100.00 d) \$105.00 e) \$120.00

10. $\frac{3-8}{3-11} =$

- a) $\frac{8}{11}$ b) $\frac{41}{11}$ c) $\frac{-38}{3}$ d) $\frac{5}{8}$ e) $\frac{-5}{14}$

11. $-5 - (-4)(6) =$

- a) 6 b) -29 c) -26 d) 19 e) 120

12. Of the following, which is closest to 1?

- a) $\frac{7}{8}$ b) $\frac{9}{10}$ c) $\frac{4}{3}$ d) $\frac{7}{6}$ e) 1.3

Precalculus

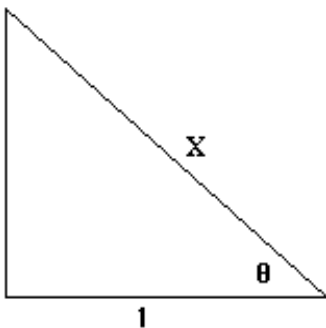
1. If the population of Landman, Kansas is given by $P(t) = 22000(1.05)^t$, where t is the number of years since 2000, in what year will the population reach 44,000 (to the nearest whole year)?

- a) 2005 b) 2010 c) 2014 d) 2019 e) 2022

2. Change $\frac{\pi}{10}$ radians into degrees

- a) 10° b) 18° c) 45° d) 36° e) 90°

3. In the right triangle shown below, find $\tan \theta$



a) x b) $\frac{1}{x}$ c) $\sqrt{x^2 - 1}$ d) $\frac{1}{\sqrt{x^2 - 1}}$ e) $\sqrt{x^2 + 1}$

4. $(\tan^2\theta)(\cos\theta)(\csc^2\theta)$

a) $(\sin^2\theta)(\cos^2\theta)$ b) 1 c) $\sin\theta$ d) $\cos\theta$ e) $\sec\theta$

5. The equation of the line passing through $(1, -5)$ with slope $\frac{1}{3}$ is

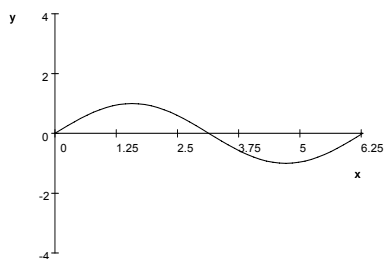
a) $x - 3y = 16$ b) $-x + 3y = 16$ c) $x + 5y = 3$

d) $2x - 7y = 4$ e) $3x + y = 2$

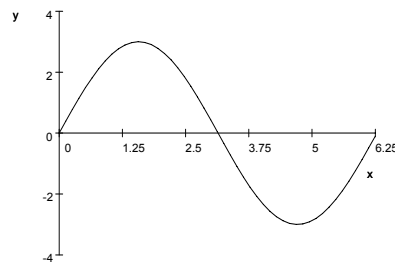
6. Which of the following best represents one cycle of $y = 3 \sin x$

Note: $2\pi \approx 6.25$ and $\frac{2\pi}{3} \approx 2.09$

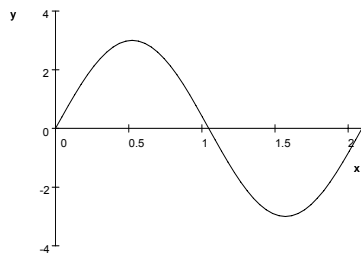
a)



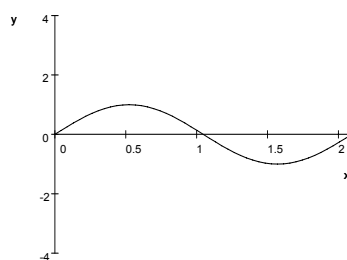
b)



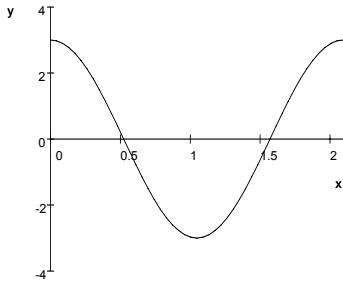
c)



d)



e)



7. If $f(x) = 3^x + x^2 - 2^{-x}$ then $f(1) =$

- a) $\frac{2}{3}$ b) 4 c) 1 d) $\frac{7}{2}$ e) 5

8. If $y = \ln(x + 2)$ then $x =$

- a) $\ln(y - 2)$ b) $e^y - 2$ c) e^{y+2} d) e^{y-2} e) $e^y + 2$

9. $\log_{25}\left(\frac{1}{5}\right) =$

- a) 5 b) -5 c) $\frac{1}{2}$ d) -2 e) $-\frac{1}{2}$

10. What is the domain of $f(x) = \sqrt{x + 3}$?

- a) $x \geq 0$ b) $x \geq 3$ c) $x \geq -3$ d) $x \leq 3$ e) $x \leq -3$

Answer Key

Math Skills

1. b 2. a 3. d 4. b 5. d 6. e 7. c 8. a 9. d
10. d 11. d 12. b

Algebra

1. c 2. e 3. a 4. b 5. d 6. b 7. a 8. e 9. d
10. c 11. b 12. e 13. e 14. d 15. a 16. c
17. b 18. b 19. e 20. d 21. d 22. a 23. a
24. c 25. b 26. a 27. c 28. b 29. d 30. c

31. e 32. b

Precalculus

1. c 2. b 3. c 4. e 5. a 6. b 7. d 8. b 9. e
10. c