

Entering Grade _____

Full Name _____

Concord Academy Mathematics Placement Test

2020

When finished, please answer the questions in the box, and return by **May 13**

About how many minutes did you spend on the test? (circle one) 0–20 30 45 60 75 90+

What comment, if any, would you like to make about your work on this placement test?

Do not use a calculator (unless you have an accommodation based on professionally administered neuropsych testing.) Look at every problem, and show work on every problem you answer.

Answers should be exact (integers, reduced fractions, or reduced radicals), no rounded decimals.

1) Simplify.

$$5 - (2)(3) + 4 - 3((1)(2) - 8)$$

2) Simplify.

$$16(x + 2) - 3(4x + 5x^2 - 2)$$

3) Solve for x .

$$4(x - 2) = x + 3$$

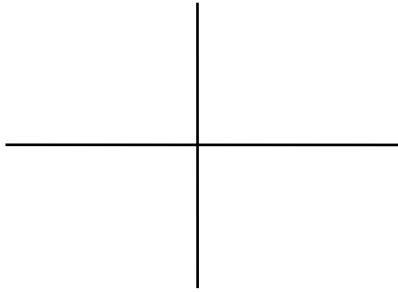
4) At a museum, tickets for adults cost \$4.50 and tickets for students cost \$3. If x student tickets were bought, and if 12 more adult tickets than student tickets were purchased, and if all tickets sold totaled \$91.50, how many student tickets were bought? Write an equation that represents this situation, and solve it to answer the question.

5) Solve for x . Express the answer as a reduced fraction.

$$-\frac{2}{3}x + 1 = 7(x + 1) + 3x$$

- 6) Write an equation for the line passing through the points $(4, -1)$ and $(6, 0)$.

- 7) Graph. Mark units clearly.
 $2x - 3y = 6$

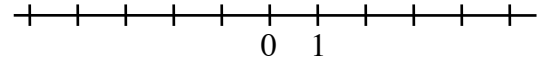


- 8) Simplify. (Assume all variables represent positive numbers.) Express the answer without negative exponents.

$$\frac{14x^3y^2}{\frac{1}{2}xy^3}$$

- 9) Solve for x , and graph the solution on the number line.

$$3 - 2x > 4$$



- 10) Multiply and simplify.

$$(2x + 3y)^2$$

- 11) Factor completely.

$$x^3 + 2x^2 - 24x$$

- 12) Solve for x by factoring.

$$x^2 - 3x = 10$$

13) Simplify fully:

$$(-2x^3y)^2 \cdot (-xy^2)^3$$

14) Solve the system for x and y .

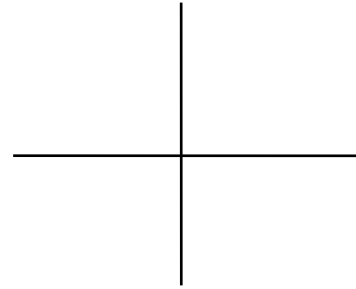
$$2x + 3y = -8$$

$$10x + y = 2$$

15) Write an equation of the line going through the point $(-1, 11)$ that is perpendicular to the line $y = 2x - 7$.16) Graph the system, and shade the region of intersection. Mark units clearly.

$$x < 2$$

$$y \geq x$$



17) Simplify (leave as a radical):

$$\sqrt{50} - 2\sqrt{18}$$

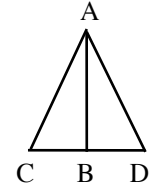
18) Solve for x :

$$4\sqrt{x+1} - 14 = -5$$

19) Write a formal proof. Do not use trigonometry or the Pythagorean theorem.

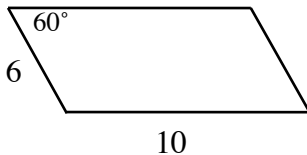
Given: Triangle ACD with B the midpoint of CD and AB perpendicular to CD

Prove: Triangle ACD is isosceles.

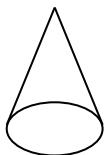


Statements	Reasons

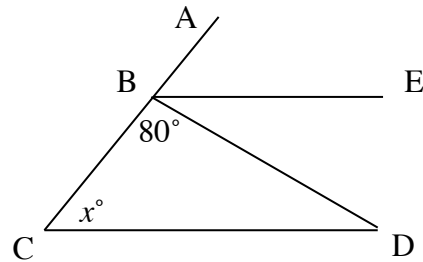
20) Lee says that the area of the parallelogram shown is 60 square units. Briefly explain why this is incorrect, and determine the correct area. Express the answer without trigonometric functions.



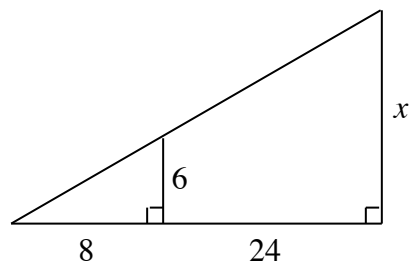
21) Determine the volume of a cone with radius 3 inches and *slant* height 5 inches. Express answer with "π" and no decimals.



22) BE bisects angle ABD. BE is parallel to CD. Solve for x. (Figure not drawn to scale.)



23) Solve for x. (Figure not drawn to scale.)

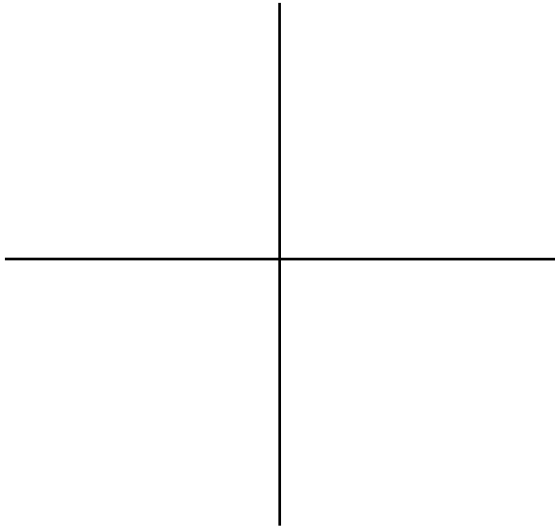


- 24) Solve for x . Express the answers as reduced radicals.

$$x^2 + 6x + 2 = 0$$

- 25) Graph the function, including all intercepts. Mark units clearly.

$$y = x^2 - 2x - 8$$



- 26) Given $f(x) = 2(x-1)^3 + 5$, find the inverse function $f^{-1}(x)$.

- 27) Simplify. (i is the imaginary unit $\sqrt{-1}$.)
Express the answer in terms of i .

$$\sqrt{-16} + i^7$$

- 28) Write as one fraction and simplify your answer completely.

$$\frac{x}{4x-8} - \frac{2}{x^2-4}$$

- 29) Simplify. (Assume all variables represent positive numbers.) Express the answer without negative exponents.

$$(-8x^6y^0)^{-2/3}$$

30) Simplify fully:

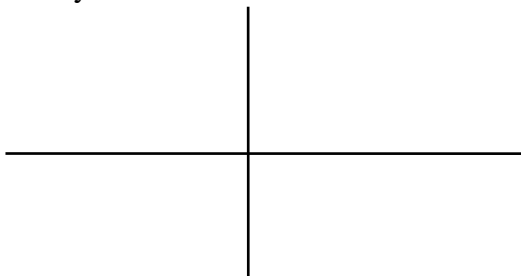
$$\frac{x+1}{x^2+4x+3} \div \frac{x^2-10x+16}{x^2+x-6}$$

31) Solve for x , and simplify. Do not use logarithms.

$$\frac{1}{8} = \sqrt{2} \cdot (4)^x$$

32) Solve for x in simplest form. Express the answer without logarithms.

$$\log_6(4) + 2\log_6(3) = x$$

33) Graph $y = -2 \cdot (0.8)^x + 3$. Mark units clearly.

34) Simplify to a single trigonometric function.

$$\frac{\sin(2x)}{1 - \cos(2x)}$$

35) Find $\sin(\cos^{-1}(-2/7))$.36) Solve for all x , $0 \leq x < 2\pi$ (radians).

$$2\sin^2(x) = 3 + 3\cos(x)$$

37) Graph exactly two complete cycles. Mark units clearly. Use radians.

$$y = \cos(3x)$$

