

### Concord Academy Mathematics Placement Test

2021

When finished, please answer the questions in the box, and return by **3:00 p.m. May 12**

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?

1. Do not use a calculator (unless you have an accommodation based on formal neuropsych testing.)
2. Don't worry if there are some problems that look unfamiliar. If a problem looks familiar, try it even if you are unsure. Show work on every problem you answer.
3. Answers should be exact (integers, reduced fractions, or reduced radicals), no rounded decimals.
4. There is a box next to each problem where you should specify whether this is something you've learned, something you've seen but forgotten, or something you have never seen. Circle one.

Learned  
 Seen but forgot  
 Never seen

1. Simplify:  $5 - 2 \cdot 3 + 4 - 3(2 - 8)$

Learned  
 Seen but forgot  
 Never seen

2. Solve for  $x$ .  $4(x - 2) = x + 3$

Learned  
 Seen but forgot  
 Never seen

3. What is the value of  $\frac{2x+1}{y}$  when  $x = -3$  and  $y = \frac{-1}{4}$ ?

Learned  
 Seen but forgot  
 Never seen

For #4 and 5: Simplify (combine like terms)

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

Learned  
Seen but forgot  
Never seen

5.  $(x+2)(x-5) - 2(x-3)^2$

Learned  
Seen but forgot  
Never seen

6. The ratio of two numbers is 3:1 and their sum is 28. Find the smaller of the two numbers.

Learned  
Seen but forgot  
Never seen

7. Solve for  $x$ . Express the answer as a reduced fraction.  $-\frac{2}{3}x + 1 = 7(x+1) + 3x$

Learned  
Seen but forgot  
Never seen

8. What is the slope of the line  $3x + 5y = 21$ ?

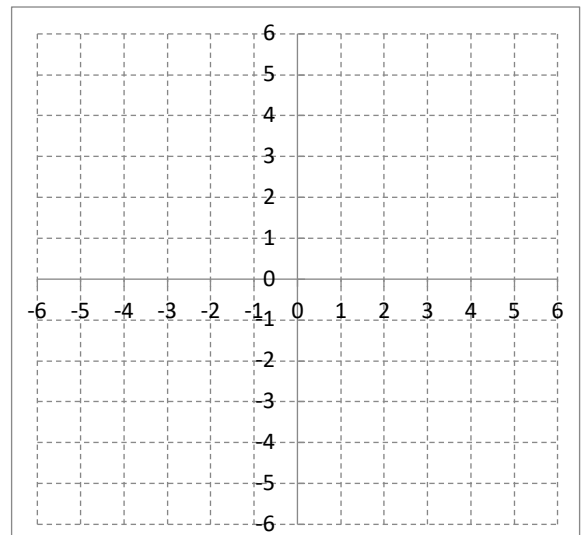
Learned  
Seen but forgot  
Never seen

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

Learned  
Seen but forgot  
Never seen

10. Graph  $2x - 3y = 6$

Learned  
Seen but forgot  
Never seen



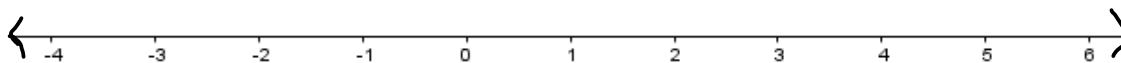
11. Simplify. Express the answer without negative exponents.

Learned  
Seen but forgot  
Never seen

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

12. Solve for  $x$ , and graph the solution on the number line.  $3 - 2x > 4$

Learned  
Seen but forgot  
Never seen



13. Multiply and simplify.  $(2x + 3y)^2$

Learned  
Seen but forgot  
Never seen

14. Factor completely:  $x^3 + 2x^2 - 24x$

Learned  
Seen but forgot  
Never seen

15. Solve for  $x$  by factoring:  $x^2 - 3x = 10$

Learned  
Seen but forgot  
Never seen

16. Simplify fully:  $(-2x^3y)^2 \cdot (-xy^2)^3$

Learned  
Seen but forgot  
Never seen

17. Solve the system for  $x$  and  $y$ .  $2x + 3y = -8$

$$10x + y = 2$$

Learned  
Seen but forgot  
Never seen

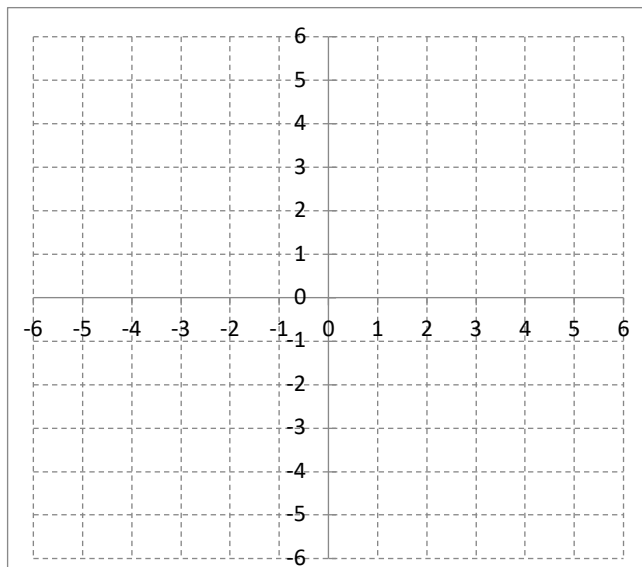
18. Write an equation of the line going through the point  $(-1, 11)$  that is perpendicular to the line  $y = 2x - 7$ .

Learned  
Seen but forgot  
Never seen

19. Graph the system and shade the solution.

$$x < 2 \text{ and } y \geq x - 1$$

Learned  
Seen but forgot  
Never seen



20. Simplify (leave as a radical):  $\sqrt{50} - 2\sqrt{18}$

Learned  
Seen but forgot  
Never seen

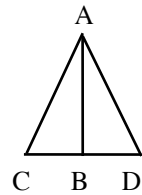
21. Solve for  $x$ :  $4\sqrt{x+1} - 14 = -5$

Learned  
Seen but forgot  
Never seen

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

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

Prove: Triangle ACD is isosceles.

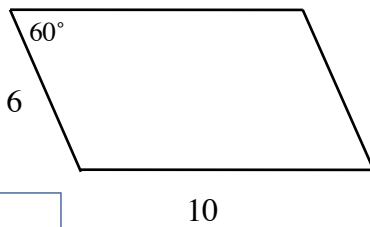


Learned  
Seen but forgot  
Never seen

Statements

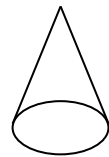
Reasons

23. 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.



Learned  
Seen but forgot  
Never seen

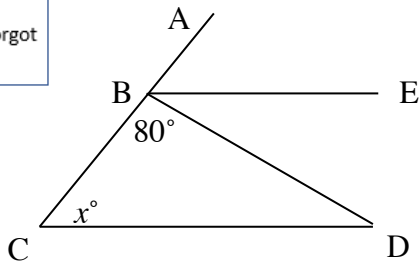
24. Determine the volume of a cone with radius 3 inches and *slant* height 5 inches. Express answer with " $\pi$ " and no decimals.



Learned  
Seen but forgot  
Never seen

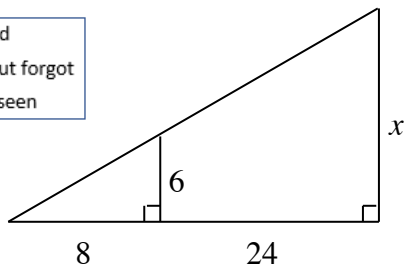
25. BE bisects angle ABD. BE is parallel to CD. Solve for  $x$ . (*Figure not drawn to scale.*)

Learned  
Seen but forgot  
Never seen



26. Solve for  $x$ . (*Figure not drawn to scale.*)

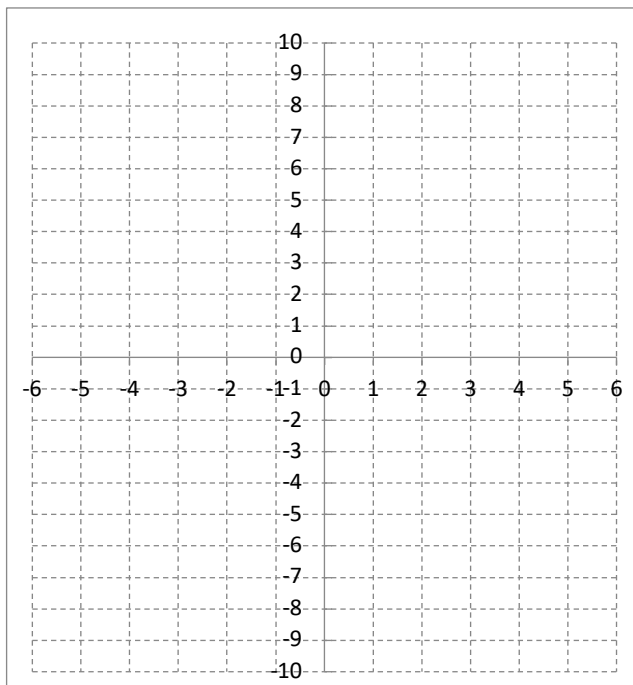
Learned  
Seen but forgot  
Never seen



27. Solve for  $x$ :  $x^2 + 6x + 2 = 0$  Express the answer(s) as simplified radical(s).

Learned  
Seen but forgot  
Never seen

28. Graph the function, labeling the coordinates of all intercepts.  $y = x^2 - 2x - 8$



Learned  
Seen but forgot  
Never seen

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

Learned  
Seen but forgot  
Never seen



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

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

Learned  
Seen but forgot  
Never seen

31. Write as a single fraction and simplify your answer completely.  $\frac{x}{4x-8} - \frac{2}{x^2-4}$

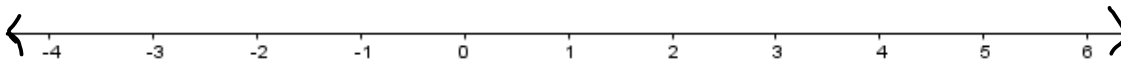
Learned  
Seen but forgot  
Never seen

32. Simplify fully:  $\frac{x+1}{x^2+4x+3} \div \frac{x^2-10x+16}{x^2+x-6}$

Learned  
Seen but forgot  
Never seen

33. Solve the inequality  $2x^2 - 24 < 2x$  and graph your solution on the number line provided.

Learned  
Seen but forgot  
Never seen



34. An item has an initial value of \$70 and its value grows by 8% per year, compounded annually. Write an expression showing its value after 11 years. Do NOT compute the value!

Learned  
Seen but forgot  
Never seen

35. Solve for  $x$ :  $\log_6(x-1) + 2\log_6(3) = 2$  Express the answer without logarithms.

Learned  
Seen but forgot  
Never seen

36. Graph  $y = -2 \cdot (0.8)^x + 3$ .

Learned  
Seen but forgot  
Never seen

