

Do all work neatly on a separate sheet. You will not get credit if you try to fit your work in on these pages.

1. Graph $y = -\frac{3}{x+7}$.

2. Identify all horizontal and vertical asymptotes of the graph of the function. $f(x) = \frac{5x}{x^2 - 1}$

3. Simplify the rational expression. $\frac{n^2 + 8n + 15}{n^2 - 25}$

4. Divide: $\frac{x^2 + 10x + 24}{x^2 - 16} \div \frac{x + 6}{x - 6}$

5. Multiply and simplify. $\frac{x^2 + 4x}{x^2 - 6x + 8} \cdot \frac{x^2 - x - 2}{3x^3 + 12x^2}$

6. Simplify: $\frac{x+7}{24x} + \frac{3x-7}{24x}$

7. Perform the operations and simplify. $\frac{3x+4}{x^2-16} - \frac{2}{x-4}$

8. Simplify: $\frac{\frac{2}{2x} - \frac{1}{3x}}{\frac{1}{x} - \frac{1}{2x}}$

Solve:

9. $\frac{x^2}{x+2} = \frac{4}{x+2}$

10. $\frac{t}{t-1} + \frac{t}{t-9} = 1$

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11. Find the distance between the points $(-1, 4)$ and $(3, 1)$.
12. Write the standard form of the equation of the parabola with its vertex at $(0, 0)$ and directrix $y = 4$.
[A] $x^2 = -16y$ [B] $y^2 = -\frac{1}{16}x$ [C] $x = 4y^2$ [D] $y = -16x^2$
13. Find the focus of the parabola: $y^2 = -28x$
[A] $(-7, 0)$ [B] $(0, 7)$ [C] $(0, -7)$ [D] $(7, 0)$
14. Sketch the graph of the equation $y = 5x^2$.
15. Write the standard form of the parabola with its vertex at $(0, 0)$ and focus at $(0, 5)$.
16. Write the standard form of the equation of the circle with radius 8 and center at $(0, 0)$.

Graph:

17. $3x^2 + 3y^2 = 48$
18. $16x^2 + 4y^2 = 64$
19. $\frac{x^2}{25} - \frac{y^2}{9} = 1$
20. Write the equation of the hyperbola with vertices at $(0, -4)$ and $(0, 4)$ and foci at $(0, -9)$ and $(0, 9)$.
21. Write the equation in standard form, then sketch the graph of the equation.
 $x^2 + y^2 + 10x - 4y + 29 = 9$
22. Find an equation of the parabola with vertex at $(-3, 1)$ and focus $(-1, 1)$.

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23. Find an equation of the hyperbola with vertices at $(-3, 2)$ and $(3, 2)$ and foci at $(-5, 2)$, $(5, 2)$.
24. Classify the conic section as a circle, an ellipse, a hyperbola, or a parabola.
 $36x^2 = 16 + 64y^2$
25. Find the first four terms of the sequence $t_n = n(6n - 4)$.
26. Write the series with summation notation. $\frac{1}{2} + \frac{1}{4} + \frac{1}{6} + \dots + \frac{1}{40}$
27. Write a rule for the n th term of the arithmetic sequence. 33, 37, 41, 45, ...
28. Find the sum of the first eight terms of the arithmetic series.
 $-\frac{1}{2} - \frac{13}{2} - \frac{25}{2} - \frac{37}{2} - \dots$
29. Write a rule for the n th term of the arithmetic sequence with $a_1 = -7$ and the common difference of $\frac{5}{2}$.
30. Give the first four terms of the geometric sequence for which $a_1 = 3$ and $r = 3$.
31. Identify the sequence as arithmetic, geometric, or neither.
1, 1, 2, 3, 5, 8, 13, ...
32. Write a rule for the n th term of the geometric sequence. $a_1 = 5$ and $r = -\frac{1}{2}$
33. Find the sum of the finite geometric series. Round your result to two decimal places.
 $\sum_{n=1}^{10} 4\left(\frac{2}{3}\right)^{n-1}$

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34. Find the sum of the finite geometric series. Round your result to two decimal places.

$$\sum_{n=1}^{10} 5\left(\frac{3}{4}\right)^{n-1}$$

35. Find the sum of the infinite geometric series $\sum_{k=1}^{\infty} -3\left(-\frac{3}{2}\right)^{k-1}$.

36. Which of the infinite geometric series does not have a sum?

A. $\sum_{n=0}^{\infty} (0.99)^n$ B. $\sum_{n=1}^{\infty} (1.01)^{n-1}$

37. Write a recursive formula for the sequence.

$$12, 6, 0, -6, \dots$$

38. Each event can occur in the given number of ways. Find the number of ways all of the events can occur. Event 1: 6 ways, Event 2: 4 ways

39. How many different ways can you arrange six scoops on a cone?

40. Write the expression represented by ${}_9P_5$.

41. Find the number of distinguishable permutations of the letters LUCKY.

42. Find the number of distinguishable permutations of the letters SWEET.

43. You own 7 cassettes and are taking 3 of them on vacation. In how many ways can you choose 3 cassettes from the 7?

44. From a group of eight boys and five girls, a boy and a girl will be selected to attend a conference. In how many possible ways can the selection be made?

45. A four-person committee is chosen at random from a group of 15 people. How many different committees are possible?

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46. How many different 3-card hands can be drawn from a standard deck of 52 playing cards?
47. Expand $(p + 3q)^3$.
48. Use the rows of Pascal's triangle to expand $(v + 3w)^3$.
49. A card is drawn from a standard deck of playing cards. Find the probability that it is not a face card (**J**, **Q**, or **K**).
50. A number cube with faces numbered 1, 2, 3, 4, 5, and 6 is rolled. Find the probability of rolling a number greater than 2.
51. A student fails to study for a 9 question true/false test. What is the probability that the student gets 5 questions correct?
52. In your last 15 soccer games, you attempted 90 goals and made 60. What is the experimental probability that you will make a goal in your next game?
53. A number cube is rolled 310 times and the results recorded as follows: there were 54 ones, 59 twos, 48 threes, 57 fours, 56 fives, and 36 sixes. What is the experimental probability of not rolling a five?
54. You, your friend, and four others are assigned seats at random in a row of 6 chairs. What is the probability that you and your friend will be seated next to each other?
55. Four cards are randomly selected from a standard 52-card deck. What is the probability of getting 4 hearts or 4 numbers less than 10 (count aces as 1)?