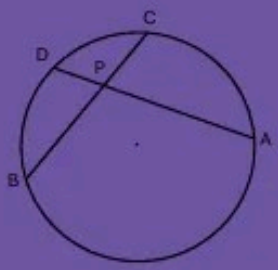
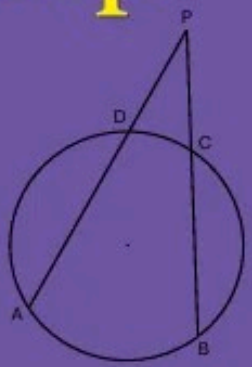
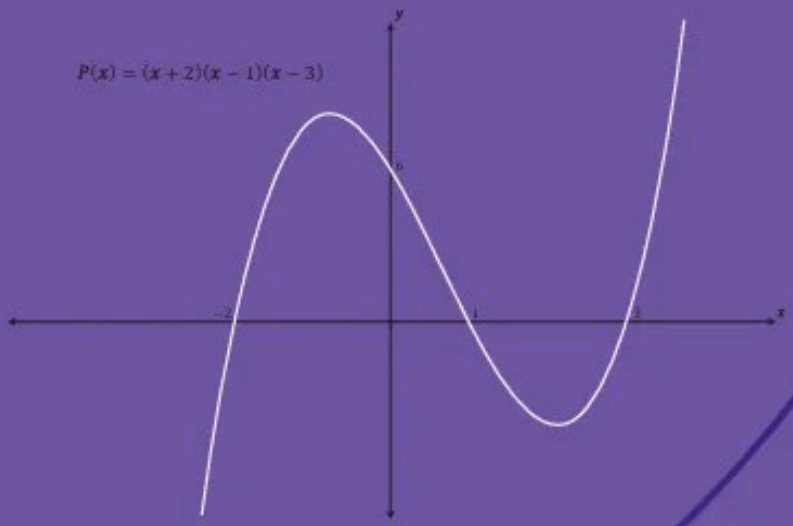
Math 3
End of Course Test Prep





$$PA \cdot PD = PB \cdot PC$$

$$P(x) = (x+2)(x-1)(x-3)$$



PREFACE

This set of cumulative review practice questions is designed to help students reinforce and consolidate the key concepts covered in Math 3. The topics included reflect a broad spectrum of skills and understanding developed throughout the course, ranging from algebraic reasoning and functions to geometry, trigonometry and data analysis.

The goal of this review is to provide comprehensive practice that not only prepares students for assessments but also deepens their mathematical thinking and problem-solving abilities. Each question is intended to reflect the rigor and style of problems encountered during the course, encouraging both accuracy and conceptual understanding.

Students are encouraged to work through these questions thoughtfully, seek out patterns, make connections between topics, and reflect on strategies used. Whether used for individual practice, group review, or classroom instruction, this resource aims to support continued growth and confidence in mathematics.

I hope teachers will find this resource very useful and that it will help their students achieve success on their End-of-Course test.

The Author

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1. Find the zeros of the function and state their multiplicity:

$$f(x) = (x-1)^3(x^2+4)(x+2)$$

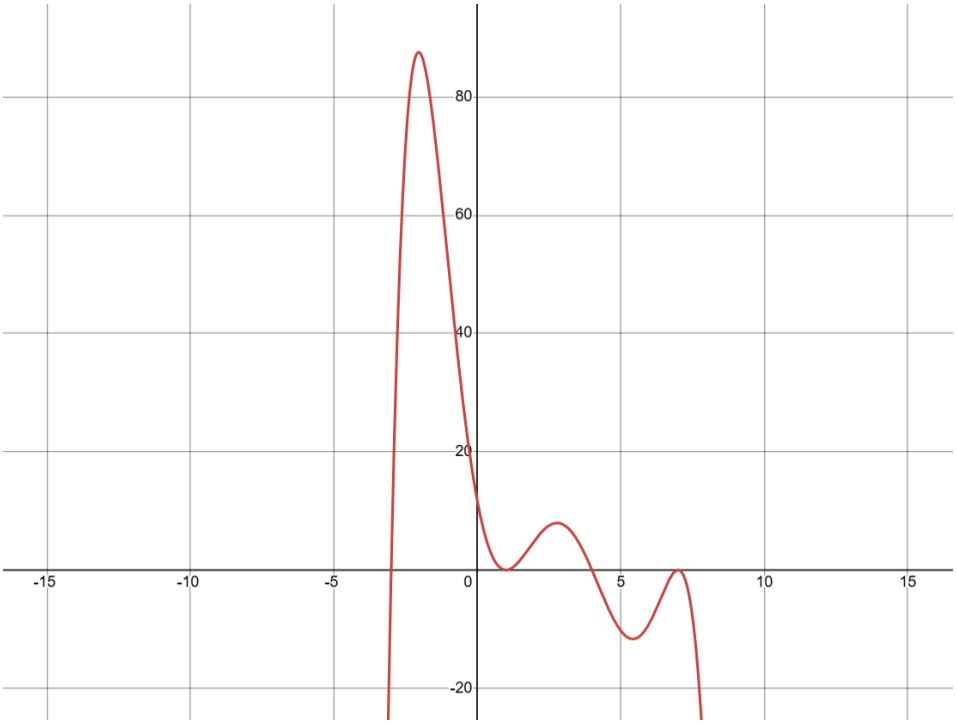
2. Find the zeros of the function and state their multiplicity:

$$f(x) = (x^2-1)^4(x+1)(x^2+2x-3)^3$$

3. How many complex solutions does the function $f(x) = 3x^4 + 2x^2 - 5$ have? How many of these solutions are real?

4. How many complex solutions does the function $f(x) = x^4 + 2x^3 - 2x^2 + 2x - 3$ have? How many of these solutions are real?

5. What is the lowest possible degree of the polynomial function graphed below?



The price per day, in dollars, that a parking garage is charging is given by the function:

$$p(t) = \begin{cases} 0, & 0 \le t \le 5 \\ 10, & 5 < t \le 60 \\ 18, & 60 < t \le 120 \\ 24, & 120 < t \le 180 \\ 30, & t > 180 \end{cases}$$, where t is the time in minutes.

Answer Questions 6-7.

6. What is the cost for 120-minute parking in the garage?

7. What is the maximum amount that someone would pay for parking per day?

George invests a certain amount of money into a bank that offers a return on investment based on the function $f(t) = 5000(1.035)^{4t}$, where t is the time in years.
Answer Questions 8-9.

8. What is the initial amount of money that George invested?

9. What is the annual interest rate that the bank offers and how often is it compounded?

10. John and Aaron would like to complete a task together. If John would work on the task by himself, it would take him 25 minutes to complete it.
The equation below determines the number of minutes it would take Aaron to complete the task by himself:

$$\frac{1}{25} + \frac{1}{x} = \frac{1}{20}$$

What is the meaning of the denominator 20 in the equation?

11. In the equation of the circle $(x + 4)^2 + (y - 5)^2 = 9$, what does the 4 represent?

Given the function:

$$f(x) = \begin{cases} -x^2 + 4, & x < -1 \\ 7 - 3x, & -1 \le x < 3 \\ |2 - x|, & x \ge 3 \end{cases}$$

Answer Questions 12-15.

12. What is the value of $f(-1)$?

13. What is the value of $f(7)$?

14. What is the value of $f(-2)$?

15. What is the value of $f(3)$?

16. What are the coordinates of the center of the circle given by the equation:

$x^2 + y^2 - 4x + 3y - 15 = 0$?

17. What is the radius of the circle given by the equation:

$x^2 + y^2 + 2x - 5y = 5$?

18. What is a factor of $x^4 + 3x^3 - 4x^2$?

A. $x + 2$
B. $x - 2$
C. $x - 4$
D. $x + 4$

19. What is the value of m in the expression $x^2 - mx + 8$ given that $(x - 1)$ is a factor?

20. What is the value of m in the expression $x^3 + mx^2 - 3x + 4$ given that $(x + 2)$ is a factor?

21. Given the polynomial function $P(x) = 2x^3 - 3x^2 - 36x + 37$.
Match each key feature of polynomial $P(x)$ from Column A with the correct description from Column B.

Column A	Column B
A. $P(x)$ is increasing	**1.** $(4.6, 0)$
B. $P(x)$ is decreasing	**2.** $-4.1 < x < 1$ and $x > 4.6$
C. $P(x)$ is positive	**3.** $y < 81$ and $y > -44$
D. $P(x)$ is negative	**4.** $-2 < x < 3$
E. $P(x)$ has a local minimum	**5.** $-44 < y < 81$
F. $P(x)$ has a local maximum	**6.** $(-4.1, 0)$
	7. $x < -4.1$ and $1 < x < 4.6$
	8. $(3, -44)$
	9. $x < -2$ and $x > 3$
	10. $(-2, 81)$

22. Factor the polynomial: $x^3 + 27$

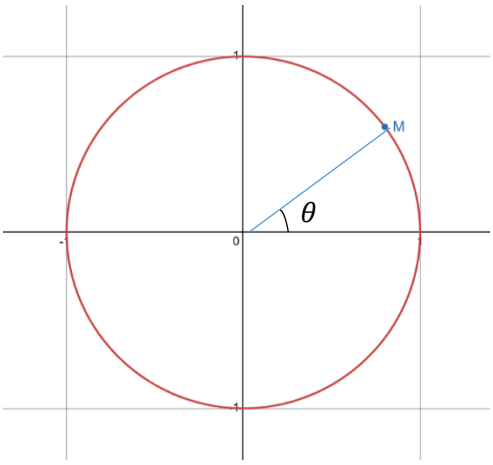
23. Factor the polynomial: $8x^3 - 125$

24. What is the rate of growth of the exponential function $y = 200(1.3)^x$?

25. What is the rate of decay of the exponential function $y = 500(0.75)^x$?

In the diagram below, point $M\left(\frac{4}{5},\frac{3}{5}\right)$ is on the circle centered in the origin.

Answer Questions 89-90.

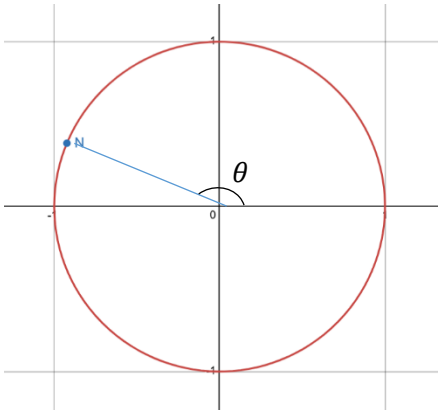


89. What is the value of $\sin\theta$?

90. What is the value of $\cos\theta$?

In the diagram below, point $N\left(-\frac{12}{13},\frac{5}{13}\right)$ is on the circle centered in the origin.

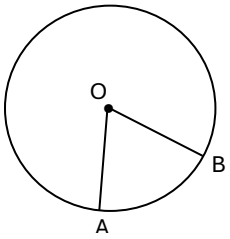
Answer Questions 91-92.



91. What is the value of $\sin\theta$?

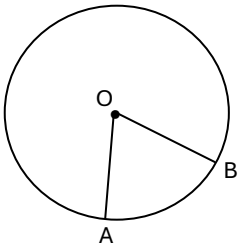
92. What is the value of $\cos\theta$?

97. In the figure below, the radius of the circle is 8 inches and $m(\angle AOB) = 58^0$. What is the area of the sector enclosed by the radii $\overline{OA}$ and $\overline{OB}$? Round your answer to the nearest tenth.

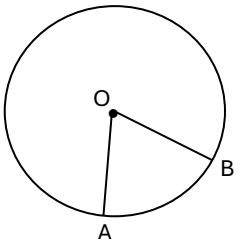


A. 30.6
B. 31.5
C. 32.4
D. 33.8

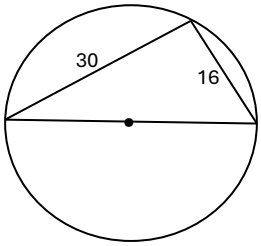
98. In the figure below, the radius of the circle is 10 inches and $m(\angle AOB) = \frac{\pi}{3}$. What is the area of the sector enclosed by the radii $\overline{OA}$ and $\overline{OB}$? Round your answer to the nearest tenth.



99. In the figure below, the radius of the circle is 17 inches and $m(\angle AOB) = 1.2\ radians$. What is the area of the sector enclosed by the radii $\overline{OA}$ and $\overline{OB}$? Round your answer to the nearest tenth.

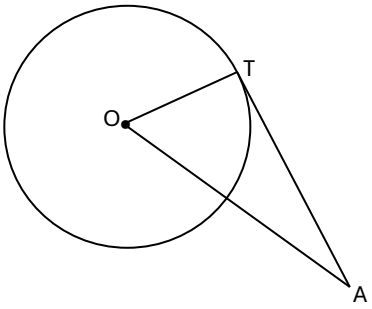


100. What is the circumference of the circle in the figure below? Round your answer to the nearest tenth.



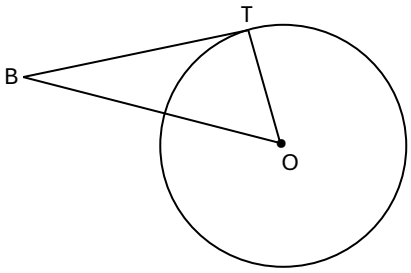
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117. In the figure below, $\overline{AT}$ is a tangent to the circle.



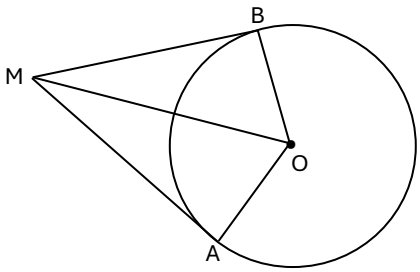
If $AT = 17$ and $OA = 24$, find the length of the radius $\overline{OT}$. Round your answer to the nearest tenth.

118. In the figure below, $\overline{BT}$ is a tangent to the circle.



If $OT = 2x + 3$, $TB = 3x - 5$ and $OB = \sqrt{97}$, find the value of x.

119. In the figure below, $\overline{MB}$ and $\overline{MA}$ are tangents to the circle.



If $MB = 27x - 38$ and $MA = 13x + 18$, find the value of x.

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ANSWER KEY

1. $x = 1$ (multiplicity 3)
$x = -2$ (multiplicity 1)
$x = \pm 2i$ (multiplicity 1)

2. $x = -1$ (multiplicity 5)
$x = 1$ (multiplicity 7)
$x = -3$ (multiplicity 3)

3. 4 complex solutions
2 real solutions

4. 4 complex solutions
2 real solutions

5. 6

6. $\$18$

7. $\$30$

8. $\$5{,}000$

9. 14% compounded quarterly

10. Number of minutes it would take to complete the task if they work together

11. The opposite of the x-coordinate of the center of the circle

12. 10

13. 5

14. 0

15. 1

16. $\left(2, -\frac{3}{2}\right)$

17. $\frac{7}{2}$

18. D

19. 9

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

21. A9 B4 C2 D7 E8 F10

22. $(x+3)(x^2-3x+9)$

23. $(2x-5)(4x^2+10x+25)$

24. 30%

25. 25%

26. No

27. 1

28. 9

29. $a = -10, b = -8$

30. $x = -1$ (multiplicity 2)
$x = 3$
$x = -1 \pm 2i$

31. $(x-2)(5x+2)(x-1)^3$

32. $x + 5 + \frac{-18}{x+2}$

33. $x^2 - 2x - 4 + \frac{-19}{x-3}$

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ANSWER KEY

68. D

69. B

70. 6

71. $\frac{1}{6}(x+4)(x-3)^2$

72. 1

73. A

74. C

75. B

76. A

77. C

78. $x > 51$

79. $x = \frac{1}{3}\log_5 \frac{7}{2}$

80. $x = \log_4 \frac{11}{5} + 3$

81. $x = \frac{1}{4}(\ln 5 - 1)$

82. $x = \frac{1}{2}(e^3 + 3)$

83. $x = \frac{7}{5}$

84. A

85. 6

86. 2.4

87. B

88. A5

89. $\frac{3}{5}$

90. $\frac{4}{5}$

91. $\frac{5}{13}$

92. $-\frac{12}{13}$

93. $-\frac{4}{5}$

94. $-\frac{3}{5}$

95. $-\frac{12}{13}$

96. $\frac{5}{13}$

97. C

98. 5.2

99. 173.4

100.106.8

101.32.4

102.80

103.5.2

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104. 8.7

105. 171

106. 6

107. $104°$

108. $92°$

109. $76°$

110. 43

111. 10

112. $a = 9, b = 38$

113. $96°$

114. $45°$

115. $96°$

116. $m(\angle QPR) = 63.5°$
Length of arc $\widehat{PQ} = 11.1$

117. 16.9

118. $(2x + 3)^2 + (3x - 5)^2 = \left(\sqrt{97}\right)^2$

119. 4

120. 368

121. 7.5

122. $165°$

123. $130°$

124. $22°$

125. $\widehat{AC} = 172°, \widehat{BC} = 100°$

126. $30°$

127. $20°$

128. $\widehat{AB} = 145°, \widehat{ACB} = 215°$

129. $27°$

130. 55

131. 26

132. 15

133. 45.4

134. $136°$

135. 16.2

136. 9.3

137. -4

138. -3 (multiplicity 2), $\pm 2i$, 1

139. $-1, 2 \pm \sqrt{5}$

140. C

141. C

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That was a sample.

The printed Math 3 End of Course Test Prep has 500 cumulative review questions: questions 1-200 where students work out and write the answer, questions 201-500 in the multiple choice format of the End-of-Course test, and the complete answer key.

Order the printed book at successfulmathematics.com/shop

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