

Math 1102 and Math 1113 Placement Test

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This document describes the prerequisites for Math 1102 (Precalculus) and Math 1113 (Introduction to Calculus), as well as provide practice problems for the placement test for these courses.

Prerequisites

1. **Math 0200 - College Algebra**

- (a) No prerequisite

2. **Math 1102 - Precalculus**

- (a) Grade 11 and Grade 12 Mathematics
- (b) One of following:
 - i. Mathematics Placement Test with placement into Math 1102
 - ii. Taken Math 0020 within the last three years and achieved a grade of C or higher.

3. **Math 1113 - Introduction to Calculus**

- (a) High school precalculus or Math 1103 (second half of 1102)
- (b) Mathematics Placement Test with placement into Math 1113

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The following are the mathematical concepts needed prior to taking Math 1102 and Math 1113. Practice problems with solutions are provided.

1. Math 1102 - Precalculus Mathematics Prerequisites

- Polynomial expressions
- Linear equations of a single variable
- Equations of lines
- Systems of equations with two variables
- Factorization
- Quadratic expressions
- Rational expressions
- Square roots

2. Math 1113 - Introduction of Calculus Mathematics Prerequisites

- All mathematics prerequisites for Math 1102
- Quadratic functions
- Polynomial functions
- Exponents and radicals
- Exponential and logarithmic functions, including natural log
- Trigonometry, including the unit circle

Practice Problems for Math 1102 Placement Test

- Evaluate $4x^2y - 3xy^2$ where $x = -2$, $y = 3$
- Simplify $(5ab - 4b) - (3ab + 2a - 6b)$
- Multiply $(6x - 2)(x^2 - 3x + 5)$
- Solve $4(3x + 5) = -5(x + 13)$
- Jo has 23 coins. She has twice as many nickels as pennies and three more dimes than pennies. How many of each type of coin does she have?
- Solve $9x - 7(x + 200) = 6600$
- The length of a rectangle is two centimetres more than twice its width. The perimeter is 34 centimetres. Find the dimension of the rectangle.
- Solve $3 - 2x < x + 9$
- Graph $4x - 5y = 10$
- Find the slope of the line passing through the points $(-5, 2)$ and $(6, -1)$
- Find the equation of the line passing through the points $(2, -1)$ and $(4, 6)$. Put it in standard form, $ax + by = c$
- Give the equation (in standard form) of the line with slope $5/6$ and y-intercept 4.
- Solve for x and y by graphing, given $x - y = 8$ and $3x + 2y = 9$
- Solve for x and y using elimination, given $5x + 3y = 10$ and $6x + 4y = 15$
- Solve for x and y using substitution, given $6x - y = 9$ and $y = 3x - 7$
- Alice spent 6 minutes on each factoring problem and 3 minutes on each evaluation problem. She spent a total of 42 minutes on 9 problems. How much time did she spend on factoring problems?
- Factor $15a^2b^3c - 45ab^3c^2 + 9b^4c^3$
- Factor $6x^2 - 12x + xy - 2y$
- Factor $a^2b^6 - 49c^4$
- Factor $27s^3 - t^6$
- Factor $t^2 - 10t + 24$
- Factor $2x^2 + x - 10$
- Factor $x^4 + 3x^2 - 18$
- Factor $36x^3 + 6x^2 - 12x$
- Solve by factoring:
 $2x^2 - 31x = 16$
- One side of a right angle triangle is 4cm less than the hypotenuse and the other is 2cm less than the hypotenuse. Find the length of all sides.
- Solve using the quadratic formula $2(x^2 - 3x) = 5$
- Simplify $\frac{84x^3y^4}{108xy}$
- Simplify $\frac{2x-2x^2}{x^2-1}$
- Simplify $\frac{7}{x^2-6x} - \frac{3}{x^2+2x}$
- Simplify $\frac{3x^2+10x-8}{5x^2+19x-4} - \frac{3x^2-23x+14}{x^2-3x-28}$
- Evaluate $\sqrt{81}$
- Evaluate $\sqrt{\frac{64}{4}}$
- Simplify $\sqrt{50a^6b^{10}}$ where $a, b \geq 0$

Solutions

1. 102
2. $2ab + 2b - 2a$
3. $6x^3 - 20x^2 + 36x - 10$
4. $x = -5$
5. 5 pennies, 10 nickles, 8 dimes
6. $x = 4000$
7. 12cm by 5cm
8. $x > 2$ or $x \in (-2, \infty)$
9. Intercepts at $(0, -2)$ and $(5/2, 0)$
10. $-3/11$
11. $7x - 2y = 16$
12. $5x + 6y = 24$
13. $(5, -3)$
14. $(5/2, 15/2)$
15. $(2/3, -5)$
16. 30 minutes
17. $3b^3c(5a^2 - 15ac + 3bc^2)$
18. $(x - 2)(6x + y)$
19. $(ab^3 - 7c^2)(ab^3 + 7c^2)$
20. $(3s - t^2)(9s^2 + 3st^2 + t^4)$
21. $(t - 6)(t - 4)$
22. $(2x + 5)(x - 2)$
23. $(x^2 - 3)(x^2 + 6)$
24. $6x(3x + 2)(2x - 1)$
25. $x = -1/2, x = 16$
26. 6cm, 8cm, 10cm
27. $\frac{3-\sqrt{19}}{2}, \frac{3+\sqrt{19}}{2}$
28. $7x^2/9y$
29. $-2x/(x + 1)$
30. $\frac{4(x+8)}{x(x-6)(x+2)}$
31. $\frac{x+4}{5x-1}$
32. 9
33. 4
34. $5\sqrt{2}a^3b^5$

Practice Problems for Math 1113 Placement Test

- Let $f(x) = 3x^2 + 8$. Find $f(-2)$
- Let $f(x) = 3x^2 + 8$. Find $\frac{f(a+h)-f(a)}{h}$
- Let $f(x) = \sqrt{3x-1}$. Find the domain.
- For children between the ages of 6 and 10, the height (in cm) is a linear function of age, t , in years. A child age 6 is 122cm tall and a child age 7 is 128cm. Express the height as a function of t .
- Let $f(x) = 3$ and $g(x) = 2x^2 - 5x$. Find $(f \circ g)(x)$.
- For $f(x) = 3x + 5$, find the inverse $f^{-1}(x)$.
- Let
$$f(x) \begin{cases} x+4 & x \leq -1 \\ x^2 & x > -1 \end{cases}$$
Find $f(-2)$.
- For $f(x) = |2x + 7| - 4$ solve $f(x) = 11$
- Solve $x^2 - x \geq 12$
- Find the domain of $f(x) = \sqrt{x^2 - 3x + 2}$
- Solve $(x-1)^2(x+3) > 0$
- Factor $x^3 + x^2 - 5x + 3$
- Solve $\frac{2x+1}{x-3} \geq 0$
- Simplify $(5x^2y^{-3})(4x^{-5}y^4)$
- Simplify $(27a^6)^{-2/3}$
- Rationalize the denominator of $\frac{\sqrt{t+5}}{\sqrt{t-5}}$
- Solve $\sqrt{x^2+9} - 1 = x$
- Solve $4^{x-3} = 8^{4-x}$
- Evaluate $\log_5 25$
- Evaluate $\log_2(\sqrt{8})$
- Evaluate $\ln(e^{-3})$
- Solve $10^x = 25$
- Solve $\log_9(x) = \frac{1}{2}$
- Solve $\log_x(36) = 2$
- When a certain drug is taken orally, the amount A in milligrams present in the bloodstream after t hours is predicted to be $A = 100(1 - \frac{t}{2})$ for $0 \leq t \leq 10$. How much of the drug is predicted to be present in the bloodstream after 2 hours?
- Solve $\log_2(x) + \log_2(x+2) = 3$
- Find the radian measure of -45°
- Find the sine, cosine and tangent of $\frac{3\pi}{2}$
- A right angle triangle has an angle, θ a hypotenuse of 7 and the side opposite the angle has a value of 4. Find the sine and cosine of θ .
- Find the exact value of $\sin(\frac{2\pi}{3})$
- Find the exact value of $\cos(\frac{-5\pi}{4})$
- Find the exact value of all angles θ in the interval $[0, 2\pi]$ that satisfy the equation $\sin(\theta) = \frac{-1}{2}$.

Solutions

- 20
- $6a + 3h$
- $[1/3, \infty)$
- $y = 6t + 86$
- $f(g(x)) = 6x^2 - 15x$
- $f^{-1}(x) = \frac{x-5}{3}$
- $f(-2) = 2$
- $x = 4$ or $x = -11$
- $(-\infty, -3) \cup [4, \infty)$
- $(-\infty, 1] \cup [2, \infty)$
- $(-3, 1) \cup (1, \infty)$
- $(x - 1)^2(x + 3)$
- $(-\infty, -\frac{1}{2}] \cup (3, \infty)$
- $20y/x^3$
- $\frac{1}{9a^3}$
- $\frac{t+10\sqrt{t}+25}{t-25}$
- 4
- $x = \frac{18}{5}$
- 2
- $3/2$
- 3
- $\log(25)$
- 3
- 6
- 25 milligrams
- 2
- $-\pi/4$
- $\sin(3\pi/2) = -1$, $\cos(3\pi/2) = 0$,
 $\tan(3\pi/2)$ does not exist
- $\sin(\theta) = 4/7$, $\cos(\theta) = \sqrt{33}/7$
- $\frac{\sqrt{3}}{2}$
- $\frac{-\sqrt{2}}{2}$
- $\frac{7\pi}{6}$, $\frac{11\pi}{6}$