PRECALCULUS MPT
SAMPLE QUESTIONS

Important Note: Calculators are not permitted when writing the Math Placement Test. In order to fully benefit from these practice problems, you should solve them without the aid of a calculator.

Introduction to Algebra

Topics Real number system; order of operations; equations; inequalities; applications.

1. Translate the words into symbols: *The number y is 6 less than twice x*.
2. True or false: $(a-b)-c=a-(b-c)$
3. You pay $29.95 for a sweater at a 20% off sale. What was the regular price?

Polynomials

Topics Adding, subtracting, multiplying and dividing polynomials; factoring.

4. Simplify: $5(2x-y+3)-(4-(x-y))$
5. Simplify: $\left(-2u^3v\right)^2\left(-v^2w^4\right)^5$
6. Expand and simplify: $(5x+4)\left(3x^2+2x+1\right)$
7. Perform the polynomial division: $(7+x-3x^3)\div(2x+1)$ and give the quotient and the remainder.
8. Factor each of the following completely:
   (a) $3y-48y^3$ (b) $3x^2+4x+1$ (c) $5y^4-18y^2-8$

Rational Expressions

Topics Multiplying, dividing, adding, subtracting and simplifying rational expressions.

9. Express in reduced form:
   (a) $\dfrac{3x^2+2x-1}{x^2-4x-5}$ (b) $\dfrac{x^2+2x+1}{x^2-2x+1}\cdot\dfrac{x^2-1}{x^2+1}$

   (c) $\dfrac{x^2-x-20}{x^2+7x+12}\div\dfrac{x^2-10x+25}{x^2+6x+9}$

10. Perform the operations and simplify:

(a) $\dfrac{x}{x-1} + \dfrac{1}{1-x}$ (b) $3\left(\dfrac{x+1}{x+2}\right) + \dfrac{1}{3}\left(\dfrac{x}{xy+2y}\right)$

(c) $\dfrac{x}{x^2+5x+6} - \dfrac{2}{x^2+3x+2}$

11. Express in reduced form:

(a) $\dfrac{\dfrac{1}{x+2}}{\dfrac{1}{x}+\dfrac{1}{2}}$ (b) $\dfrac{2+\dfrac{1}{x}}{\dfrac{1}{(x+1)^2}-\dfrac{1}{x^2}}$

Radicals and Rational Exponents

Topics Expressing and simplifying roots in radical and rational exponent notation; rationalizing numerators and denominators; simplifying negative exponent forms.

12. Evaluate: (a) $\sqrt{(-7)^2}$ (b) $\sqrt[3]{-0.125}$

13. Simplify: $\sqrt[3]{8x^5y^4}$

14. Expand and simplify: $\left(\sqrt{x}+\sqrt{y}\right)^2$

15. Rationalize the denominator: (a) $\dfrac{5}{2\sqrt[3]{7}}$ (b) $\dfrac{\sqrt{a}+\sqrt{3}}{\sqrt{a}-\sqrt{3}}$

16. Rewrite each expression so that it contains only positive exponents and simplify.

(a) $(2+a-4)^0$ (b) $\left(a^2+b^2\right)\left(a^{-2}+b^{-2}\right)$

(c) $\left(\dfrac{-x^{-1}}{x^{-5}}\right)^{-2}$ (d) $\dfrac{2x^{-3}-y^{-2}}{x+y^{-1}}$

(e) $\left(3a^{-2}+b^{-2}\right)^{-1}$

Equations and Inequalities

Topics Solving linear and quadratic equations; linear inequalities; absolute value; applications.

17. Solve each of the following for x:

(a) $5(2-3x)+3=7-6x$

(b) $5-[4-3(x+2)]=5x$

(c) $\frac{1}{12}(3x+1)^2=\frac{3}{4}x\left(x-\frac{2}{3}\right)$

(d) $\frac{x}{x-1}+\frac{2}{x+1}=\frac{2}{x^2-1}$

(e) $\frac{1}{x}-\frac{2}{x+2}+\frac{1}{x+3}=0$

(f) $\frac{ax+b}{c}-2x=\frac{x}{a+c}$

18. The perimeter of a rectangular lot is 420 feet. The lot is two-and-one half times as long as it is wide. What are the dimensions of the lot?

19. How many millilitres of 5% butterfat milk and 1% butterfat milk should be mixed to create one litre (1000 ml) of 4% butterfat milk?

20. A ferry leaves Nanaimo to make the 22 km trip to Vancouver at the same time as a ferry leaves Vancouver for Nanaimo. The ferry leaving Nanaimo travels 2 km/h faster than the other ferry. How far are they from Vancouver when they meet 45 minutes later?

21. Solve each of the following equations for x:

(a) $(2x+1)(3x+2)=3x+2$

(b) $(x-5)(x-2)=4$

(c) $3x^2-x=10$

(d) $3x^2-7x-2=0$

(e) $\frac{x}{x-5}+\frac{3}{x+1}=\frac{30}{x^2-4x-5}$

22. A rectangle has a perimeter of 100 cm and an area of 200 cm^2. Find its dimensions.

23. Solve each of the following equations for x:

(a) $x^{-1}+x^{-2}=2$

(b) $x^{3/2}=-8$

(c) $x-\sqrt{9-x}=7$

(d) $3x^4-5x^2+2=0$

24. Solve each of the following for x:

(a) $\frac{2x+5}{3}<5-\frac{1-x}{2}$

(b) $|2x+3|=15$

(c) $|8-5x|>12$

Geometry

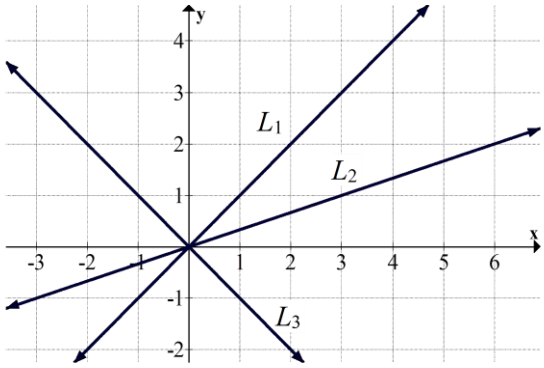
Topics Cartesian co-ordinate system; distance between points in the plane; equations of lines and circles; applications.

25. Find the distance between the points $(1, 2)$ and $(4, 1)$.

26. Find an equation for the circle with radius 3 and centre at $(-1, 4)$.

27. Determine the radius and center of the circle defined by the equation $x^2 + y^2 - 5x + 2y = 0$.

28. Determine an equation for each of the lines shown.



29. Determine an equation for the line passing through the points $(7, 2)$ and $(-2, -1)$.

30. Determine which of the following lines are parallel, and which are perpendicular to the line $2y - 1 = 3(x + 2)$:

A : $2x + 3y = 7$ B : $x = 2$ C : $y = \frac{3}{2}$

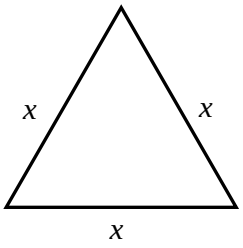
D : $y = 1.5x + 2$ E : $x = 1.5y - 1$

31. Determine which of the following lines are parallel, and which are perpendicular to the line $y = 5$:

A : $2x + 2y = 7$ B : $x = 2$ C : $y = \pi$

D : $x - y = 2$ E : $3(x - y) = 3x - 1$

32. Express the area of an equilateral triangle in terms of its side length, *x*.



33. Express the area of the trapezoid in terms of the length *x*.