

MTH1W Review — Getting Ready for MPM2D

About 60 minutes. Show all your work on your own paper. You will need grid paper for questions D2, D5(c) and E2(b).

A. Exponent laws

Grade 10 connection: you will expand expressions like $(2x + 5)^2$, and meet zero and negative exponents in $y = 2^x$.

A1 Evaluate.

- a) 2^5 b) $(-3)^4$ c) -3^4 d) 5^0 e) 2^{-3}

A2 Write as a single power.

- a) $3^4 \times 3^5$ b) $7^{10} \div 7^4$ c) $(5^3)^4$
d) $\frac{2^6 \times 2^3}{2^5}$ e) $(x^3)(x^7)$ f) $\frac{(y^5)^2}{y^3}$

A3 Simplify.

- a) $(4x^3)(-3x^5)$ b) $\frac{18a^7b^3}{6a^2b}$ c) $(2m^3)^4$
d) $(-3x^2y)^3$ e) $\frac{(6x^5)(2x^3)}{4x^6}$ f) $(x^4)^3 \times (5x)^0$

A4 Scientific notation.

- a) Write 4 500 000 in scientific notation.
b) Write 0.000 032 in scientific notation.
c) Evaluate $(3 \times 10^4)(2 \times 10^5)$. Give your answer in scientific notation.
d) A student wrote $2^3 \times 2^4 = 4^7$. Explain the mistake and give the correct value.

B. Simplifying expressions

Grade 10 connection: expanding and factoring are the main tools for solving quadratic equations.

B1 Simplify by collecting like terms.

- a) $5x + 3 - 2x + 7$ b) $4a^2 - 3a + 2a^2 + 5a - 1$ c) $3xy - 5x + 2xy + x$

B2 Expand and simplify.

- a) $4(2x - 5)$ b) $-3(x^2 - 4x + 2)$ c) $2x(3x + 7)$
d) $5(x + 2) - 3(2x - 1)$ e) $3(2a - 4) + 2(a + 6)$ f) $x(x + 4) - 2(x^2 - 3x)$

B3 Which of these expressions are equivalent to $6x - 9$? Show how you know.

- a) $3(2x - 3)$ b) $6(x - 9)$ c) $2(3x - 4) - 1$ d) $9 - 6x$

B4 A rectangle has a length of $x + 5$ and a width of $2x$.

- a) Write and simplify an expression for its perimeter.
- b) Write and simplify an expression for its area.
- c) Find the perimeter and the area when $x = 3$.

C. Solving equations

Grade 10 connection: solving linear systems and rearranging to $y = mx + b$ happen in almost every lesson.

C1 Solve. Check each answer by substituting it into the equation.

- a) $5 - 2x = 17$
- b) $7x - 4 = 3x + 18$
- c) $2(3x + 1) - 5 = 4x + 9$
- d) $\frac{x}{4} + 3 = 7$
- e) $\frac{2x - 1}{3} = 5$
- f) $0.5(x + 6) = 2x - 3$

C2 Rearrange each formula to solve for the variable shown.

- a) $y = 3x - 6$, for x
- b) $2x + 5y = 10$, for y
- c) $P = 2l + 2w$, for w

C3 A number is tripled and then decreased by 8. The result is 25. Write an equation and solve it to find the number.

D. Graphing lines

Grade 10 connection: slope, y -intercepts, and parallel and perpendicular lines are the base of analytic geometry, and moving a line prepares you for moving parabolas.

D1 State the slope and the y -intercept of each line.

- a) $y = 2x - 5$
- b) $y = -\frac{3}{4}x + 1$
- c) $y = 6$
- d) $3x + y = 8$
- e) $2x - 4y = 12$

D2 On grid paper, graph each relation. Use a table of values, or the slope and y -intercept.

- a) $y = 3x - 2$
- b) $y = -\frac{1}{2}x + 4$
- c) $x + y = 5$
- d) $x = -3$
- e) $2x - 3y = 6$

D3 Find the slope of the line through each pair of points.

- a) $(1, 2)$ and $(4, 11)$
- b) $(-2, 5)$ and $(4, 1)$
- c) $(3, -1)$ and $(3, 6)$
- d) $(-5, 4)$ and $(2, 4)$

D4 Write the equation of each line in the form $y = mx + b$.

- a) slope 4, y -intercept -7
- b) slope -2 , through $(3, 1)$
- c) through $(2, 3)$ and $(6, 11)$
- d) the line in the graph below
- e) the line in the table below

Graph for part d:

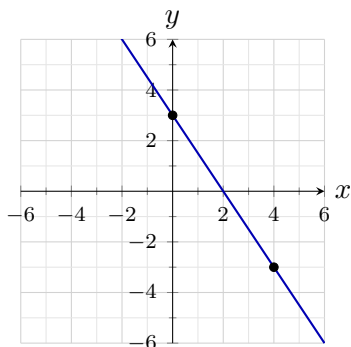


Table for part e:

x	y
0	5
1	8
2	11
3	14

D5 Parallel and perpendicular lines.

- a) Which of these lines are parallel? $y = 2x + 3$ $y = 3x + 2$ $y = 2x - 5$ $4x - 2y = 6$
- b) Write the equation of the line that is parallel to $y = -3x + 4$ and has a y -intercept of -2 .
- c) **Preview of Grade 10:** on one grid, graph $y = 2x$ and $y = -\frac{1}{2}x$. Measure the angle where they cross. What do you notice about the two slopes?

D6 Describe how the graph of $y = 2x$ changes to become each line (translation, reflection or rotation).

- a) $y = 2x + 3$
- b) $y = -2x$
- c) $y = 5x$

E. Linear relations in real situations

Grade 10 connection: you will write and solve linear systems to compare real plans and prices.

E1 Maple Movers charges a \$120 flat fee (a fixed amount) plus \$85 per hour.

- a) Write an equation for the total cost, C , in dollars, for a move that takes h hours.
- b) How much does a 4.5-hour move cost?
- c) A family has \$800 to spend on movers. How many hours can they afford?
- d) What does the slope mean in this situation? What does the C -intercept mean?

E2 Speedy Moves charges a \$200 flat fee (a fixed amount) plus \$60 per hour.

- a) Write an equation for Speedy Moves' total cost.
- b) On the same axes, graph the cost equations for both companies, from 0 to 8 hours.
- c) Find the point of intersection algebraically.
- d) Explain what the point of intersection means for a family choosing a mover.
- e) A move takes 6 hours. Which company is cheaper, and by how much?

E3 Water drains from a pool at a steady rate.

Time, t (min)	0	5	10	15	20
Water, W (L)	12 000	11 250	10 500	9 750	9 000

- a) Is the relationship linear? How do you know?
- b) What is the rate of change? Include units.
- c) Write an equation for the water remaining, W , after t minutes.
- d) When will the pool be empty?

E4 Is each relationship linear or non-linear?

- a) A phone plan costs \$25 per month plus \$0.10 per text.
- b) Money in a bank account earning compound interest.
- c) The area of a square compared with its side length.
- d) The cost of gas at \$1.60 per litre.

F. Right triangles and proportions

Grade 10 connection: the Pythagorean theorem and proportions lead to the length formula, similar triangles and trigonometry.

F1 Find the unknown side length of each right triangle.

- a) The legs are 9 cm and 12 cm. Find the hypotenuse.
- b) The hypotenuse is 13 m and one leg is 5 m. Find the other leg.

F2 At the same time of day, a 1.8 m tall student makes a 2.4 m shadow and a tree makes a 16 m shadow. How tall is the tree?