

PRINCIPLES OF MATHEMATICS 10

SAMPLE QUESTIONS



A NUMBER	A1 classify numbers as natural, whole, integer, rational, or irrational and describe contexts where they are used
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Knowledge

Prescribed Learning Outcomes – A1

1. To which set of numbers does 6.414114111 ... belong?

- A. Natural
- B. Integer
- C. Rational
- * D. Irrational

A NUMBER	A2 describe how natural, whole, integer, rational, and irrational number sets are “nested” within the real number system
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Understanding

Prescribed Learning Outcomes – A2

2. To which set(s) of numbers does 8 belong?

I.	Natural
II.	Integer
III.	Rational

- A. I only
- B. I and II only
- C. I and III only
- * D. I, II and III

A NUMBER	A3 perform arithmetic operations on irrational numbers using appropriate decimal approximations
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Knowledge

Prescribed Learning Outcomes – A3

3. Evaluate $\sqrt[3]{28} + 2$ to two decimal places.

Answer

5.04

Understanding

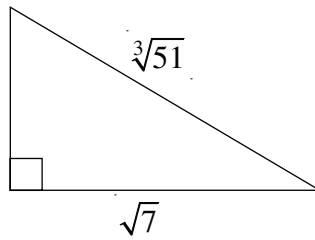
Prescribed Learning Outcomes – A3

4. Which of the following arranges the numerical expressions shown below in order from the smallest value to the largest value?

I.	$-3\sqrt{7}$
II.	8
III.	$4\sqrt{6}$
IV.	$5\sqrt{3}$
V.	$-2\sqrt{15}$

- *
 A. I, V, II, IV and III
 B. I, V, IV, II and III
 C. V, I, II, IV and III
 D. V, I, IV, III and II

Use the following diagram to answer question 5.

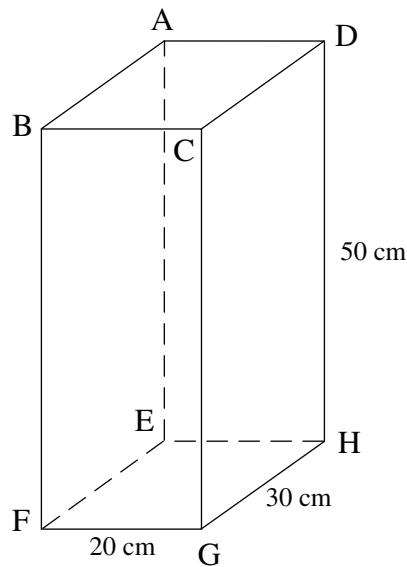


5. What is the perimeter of the triangle to two decimal places?

Answer

8.95

6. A rectangular prism has dimensions shown in the diagram below.
A spider travels in a straight line directly from A to C and then from C to F.

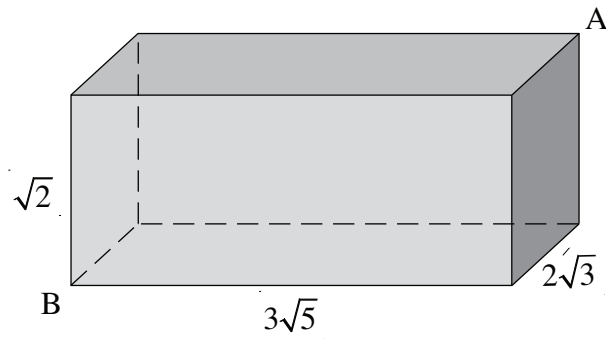


Calculate the total distance travelled by the spider to the nearest tenth of a centimetre.

Answer

89.9

Use the following diagram to answer question 7.



7. What is the length of diagonal AB? Answer to two decimal places.

Answer

7.68

A NUMBER	A4 perform operations on irrational numbers of monomial and binomial form, using exact values
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Knowledge

Prescribed Learning Outcomes – A4

8. Simplify : $5\sqrt{6} + 3\sqrt{6} - \sqrt{6}$

- A. $6\sqrt{6}$
- * B. $7\sqrt{6}$
- C. $8\sqrt{6}$
- D. $9\sqrt{6}$

Understanding

Prescribed Learning Outcomes – A4

9. Simplify : $2\sqrt{50} + \sqrt{32}$

- A. $4\sqrt{5} + 4\sqrt{2}$
- B. $2\sqrt{82}$
- * C. $14\sqrt{2}$
- D. $66\sqrt{2}$

Understanding

Prescribed Learning Outcomes – A4

10. Expand : $(2\sqrt{5} + \sqrt{7})^2$

- A. 17
- B. 27
- C. $27 + 2\sqrt{35}$
- * D. $27 + 4\sqrt{35}$

11. Simplify : $\frac{(-3\sqrt{6})(-2\sqrt{24})}{-\sqrt{18}}$

- A. $12\sqrt{3}$
- B. $12\sqrt{2}$
- C. $-12\sqrt{3}$
- * D. $-12\sqrt{2}$

12. Simplify : $\frac{\sqrt{a}}{1+\sqrt{a}}$

- * A. $\frac{a-\sqrt{a}}{a-1}$
- B. $\frac{a-\sqrt{a}}{a+1}$
- C. $\frac{a+\sqrt{a}}{a-1}$
- D. $\frac{3\sqrt{a}}{a+1}$

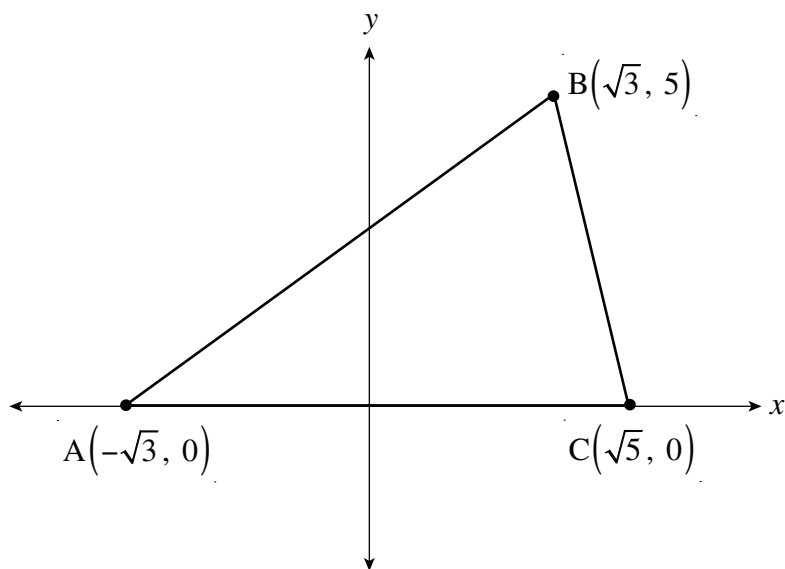
13. The following steps represent Tony's attempt to rationalize $\frac{2\sqrt{7} + \sqrt{3}}{3\sqrt{7} - \sqrt{3}}$.

Identify the first line in which a mistake occurs.

$$\begin{aligned} & \frac{2\sqrt{7} + \sqrt{3}}{3\sqrt{7} - \sqrt{3}} \times \frac{3\sqrt{7} + \sqrt{3}}{3\sqrt{7} + \sqrt{3}} && \text{I} \\ & = \frac{6\sqrt{49} + 2\sqrt{21} + 3\sqrt{21} + \sqrt{9}}{9\sqrt{49} + 3\sqrt{21} - 3\sqrt{21} - \sqrt{9}} && \text{II} \\ & = \frac{42 + 5\sqrt{21} + 3}{63 - 3} && \text{III} \\ & = \frac{45 + 5\sqrt{21}}{60} && \text{IV} \\ & = \frac{9 + 5\sqrt{21}}{12} && \text{V} \end{aligned}$$

- A. II
 B. III
 C. IV
 * D. V

Use the following diagram to answer question 14.



14. What is the area of $\triangle ABC$?

A. $5\sqrt{2}$

B. $\frac{5\sqrt{2}}{2}$

C. $\frac{5(\sqrt{5} - \sqrt{3})}{2}$

* D. $\frac{5(\sqrt{5} + \sqrt{3})}{2}$

A NUMBER	<p>A5 explain and apply the exponent laws for powers of numbers, including</p> <ul style="list-style-type: none"> - $x^m \cdot x^n = x^{m+n}$ - $x^m \div x^n = x^{m-n}$ - $(x^m)^n = x^{mn}$ - $(xy)^m = x^m y^m$ - $\left(\frac{x}{y}\right)^m = \frac{x^m}{y^m}, y \neq 0$ - $x^0 = 1, x \neq 0$ - $x^{-m} = \frac{1}{x^m}, x \neq 0$
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Understanding

Prescribed Learning Outcomes – A5

15. Simplify : $\frac{(3x^2y^4)^2}{(-xy)^3}$

- * A. $-9xy^5$
- B. $-2xy^5$
- C. $-3xy^3$
- D. $6xy^5$

Understanding

Prescribed Learning Outcomes – A5

16. Simplify : $\frac{(2x^{-1}y^{-3})^{-3}}{(3xy^{-2})^4}$

- A. $-\frac{y^{17}}{2x}$
- * B. $\frac{y^{17}}{648x}$
- C. $\frac{y}{648x}$
- D. $\frac{1}{648xy}$

17. Simplify : $\frac{(x^a)^3}{x^a x^{-3}}$

A. x^{6a}

* B. x^{2a+3}

C. x^{2a-3}

D. $\frac{x^{a^3}}{x^{-3a}}$

A NUMBER	A6 explain and apply the exponent laws for powers of numbers and for variables with rational exponents
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Knowledge

Prescribed Learning Outcomes – A6

18. Which of the following is equivalent to $\sqrt[5]{x^2}$?

- * A. $x^{\frac{2}{5}}$
- B. $x^{\frac{5}{2}}$
- C. x^{10}
- D. $x^{\frac{1}{10}}$

Understanding

Prescribed Learning Outcomes – A6

19. Which of the following is equivalent to $\sqrt[4]{\frac{x^3}{a^5}}$?

- * A. $\frac{x^{\frac{3}{4}}}{a^{\frac{5}{4}}}$
- B. $\frac{x^{\frac{4}{3}}}{a^{\frac{5}{5}}}$
- C. $\frac{x^{12}}{a^{20}}$
- D. $\frac{x^3}{a^4}$

Understanding

Prescribed Learning Outcomes – A6

20. Simplify : $x^{\frac{3}{4}} \cdot x^{\frac{1}{4}} + x$

A. $x^{\frac{9}{4}}$

B. x^2

C. $x^{\frac{5}{4}}$

* D. $2x$

Higher Mental Processes

Prescribed Learning Outcomes –A6

21. Simplify : $\left(\frac{24x^4y^3}{3xy^{-3}}\right)^{-\frac{1}{3}}$

A. $\frac{1}{2x}$

* B. $\frac{1}{2xy^2}$

C. $\frac{1}{8xy^2}$

D. $\frac{1}{8x}$

B PATTERNS AND RELATIONS (<i>Patterns</i>)	B1 use expressions to represent general terms for arithmetic growth, and apply these expressions to solve problems
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Knowledge

Prescribed Learning Outcomes – B1

22. Which of the following represents an arithmetic sequence?

- A. 1, 1, 2, 3, 5, ...
- B. 1, 4, 9, 16, 25, ...
- * C. 2, 10, 18, 26, 34, ...
- D. 3, 9, 27, 81, 243, ...

Understanding

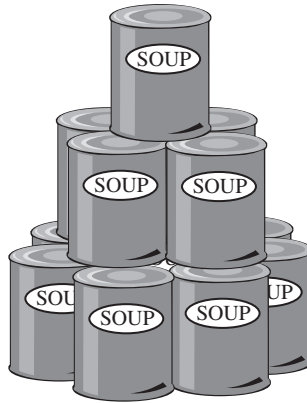
Prescribed Learning Outcomes – B1

23. Determine t_{21} for the following arithmetic sequence : $-6, -2, 2, 6, 10, \dots$

Answer

74

24. Henry has set up in his grocery store a display of soup cans as shown in the diagram below. The top row (Row 1) has 1 soup can and each successive row has 3 more cans than the previous row.



Which of the following is an expression for the number of cans in Row n ?

- A. $3n - 3$
 * B. $3n - 2$
 C. $3n + 2$
 D. $3n + 3$

Use the following information to answer question 25.

A local library has books arranged on shelves such that there are 15 books on the third shelf and 57 books on the tenth shelf. The number of books on each successive shelf is represented by an arithmetic sequence.

Higher Mental Processes

Prescribed Learning Outcomes – B1

25. How many books in total are on the first two shelves?

Answer

12

B PATTERNS AND RELATIONS <i>(Patterns)</i>	B2 use expressions to represent sums for arithmetic growth, and apply these expressions to solve problems
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Use the following information to answer question 26.

A local library has books arranged on shelves such that there are 15 books on the third shelf and 57 books on the tenth shelf. The number of books on each successive shelf is represented by an arithmetic sequence.

Understanding

Prescribed Learning Outcomes – B2

26. If there are only 10 shelves of books, what is the total number of books?

- A. 57
- * B. 300
- C. 360
- D. 570

Understanding

Prescribed Learning Outcomes – B2

27. Pat's starting salary is \$32 500. At the end of every year, Pat gets a raise of \$500. At the end of 15 years, what will be the total sum earned over the entire 15-year period?

- A. \$487 500
- * B. \$540 000
- C. \$543 750
- D. \$592 500

28. Find the sum of the arithmetic series $(-100) + (-97) + (-94) + \dots + 107$.

Answer

245

29. In an arithmetic series, $S_5 = -35$ and $S_6 = -33$. Determine the first term of the series.

Answer

-13

B PATTERNS AND RELATIONS (Patterns)	B3 relate arithmetic sequences to linear functions defined over the natural numbers
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Understanding

Prescribed Learning Outcomes – B3

30. The terms of the arithmetic sequence 6, 13, 20, ... could be represented by

- A. $y = x + 7$
- B. $y = 6x - 1$
- * C. $y = 7x - 1$
- D. $y = 6x + 7$

B PATTERNS AND RELATIONS <i>(Variables and Equations)</i>	B4 factor polynomial expressions of the form $ax^2 + bx + c$ and $a^2x^2 - b^2y^2$ <i>Clarification: Factoring polynomials may include polynomials with degree greater than two</i>
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Knowledge

Prescribed Learning Outcomes – B4

31. What value of k would make $x^2 - 4x + k$ a perfect square trinomial?

Answer

4

Understanding

Prescribed Learning Outcomes – B4

32. Which of the following is a factor of $x^3 - 5x^2 - 24x$?

- * A. $x - 8$
- B. $x - 3$
- C. $x + 4$
- D. $x + 6$

Understanding

Prescribed Learning Outcomes – B4

33. Which of the following is a factor of $6x^2 + 5x - 6$?

- A. $x - 6$
- B. $2x - 3$
- * C. $3x - 2$
- D. $3x + 2$

34. Which of the following is a factor of $3x^2 - 12$?

- * A. $x - 2$
- B. $x - 4$
- C. $x + 4$
- D. $3x - 4$

35. Factor : $(x + y)^2 + 7(x + y) + 12$

- A. $(x + 3)(x + 4)$
- B. $(x + 3y)(x + 4y)$
- C. $(x + y + 6)(x + y + 2)$
- * D. $(x + y + 3)(x + y + 4)$

36. Which of the following is a factor of $2(x + 3)^2 + 7(x + 3) + 3$?

- * A. $2x + 7$
- B. $x + 4$
- C. $x + 3$
- D. $2x + 1$

37. Which of the following is a factor of $5x^4 - 80$?

- * A. $x + 2$
- B. $x + 4$
- C. $5x - 4$
- D. $x^2 - 2$

38. What are the integral values of k so that $2x^2 + kx - 1$ can be factored?

- A. $-1, 2$
- B. $-2, 2$
- C. $-2, 1$
- * D. $-1, 1$

<p>B PATTERNS AND RELATIONS (Variables and Equations)</p>	<p>B5 find the product of polynomials (i.e., monomials, binomials, trinomials) <i>Clarification: Multiplying polynomials include:</i></p> <ul style="list-style-type: none"> – multiplying a monomial by a polynomial – multiplying a binomial by a binomial – multiplying a binomial by a trinomial – squaring a binomial – cubing a binomial
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Knowledge

Prescribed Learning Outcomes – B5

39. When expanded, how many terms does the product of $(2x + 5)(2x - 5)$ have?
- A. 1
 - * B. 2
 - C. 3
 - D. 4

Knowledge

Prescribed Learning Outcomes – B5

40. When $(x + 6)(x^2 - 2x + 4)$ is expanded and simplified into the form $ax^3 + bx^2 + cx + d$, what is the value of d ?

Answer

24

Understanding

Prescribed Learning Outcomes – B5

41. Expand : $(x - 2y)^2$
- A. $x^2 + 4y^2$
 - B. $x^2 - 2xy + 4y^2$
 - * C. $x^2 - 4xy + 4y^2$
 - D. $x^2 + 4xy + 4y^2$

42. Expand : $(x - 4)^3$

- * A. $x^3 - 12x^2 + 48x - 64$
- B. $x^3 + 12x^2 + 48x + 64$
- C. $x^3 + 4x^2 - 16x - 64$
- D. $x^3 - 64$

43. When $(x + 6)(x^2 - 2x + 4)$ is expanded into the form $ax^3 + bx^2 + cx + d$, what is the value of b ?

- A. -8
- B. -4
- * C. 4
- D. 8

44. Expand : $-(x + a)(x - a)$

- * A. $-x^2 + a^2$
- B. $-x^2 - a^2$
- C. $-x^2 - 2a - a^2$
- D. $-x^2 - 2ax + a^2$

45. Expand : $(2x + 3)(x - 3) - (x - 2)^2$

- A. $x^2 - x - 5$
- * B. $x^2 + x - 13$
- C. $x^2 - 7x - 5$
- D. $x^2 + 7x - 13$

46. If the product of $(2x + 1)(x^2 + kx - 4) = 2x^3 - 5x^2 - 11x - 4$, what is the value of k ?

- * A. -3
- B. -2
- C. 2
- D. 3

<p>B PATTERNS AND RELATIONS (Variables and Equations)</p>	<p>B6 divide a polynomial (P or $P(x)$) by a binomial (D or $D(x)$) and express the result in the forms</p> <ul style="list-style-type: none"> - $\frac{P}{D} = Q + \frac{R}{D}$ - $P(x) = D(x)Q(x) + R$, where Q and $Q(x)$ denote the quotient and R denotes the remainder <p><i>Clarification: Dividing polynomials may include binomial divisors of the form $(ax + c)$ or $(ax^2 + c)$</i></p>
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Knowledge

Prescribed Learning Outcomes – B6

47. When $2x^3 + 2x^2 - 7$ is divided by $x + 1$, the quotient is $2x^2$ and the remainder is -7 . Which of the following represents this result?

A. $\frac{2x^3 + 2x^2 - 7}{x + 1} = 2x^2 - 7$

B. $\frac{2x^3 + 2x^2 - 7}{2x^2} = (x + 1) - 7$

C. $2x^3 + 2x^2 - 7 = 2x^2 - \frac{7}{x + 1}$

* D. $2x^3 + 2x^2 - 7 = 2x^2(x + 1) - 7$

Understanding

Prescribed Learning Outcomes – B6

48. Determine the quotient : $(x^3 - x^2 + 3x - 4) \div (x - 2)$

A. $x^2 + x + 1$

* B. $x^2 + x + 5$

C. $x^2 - 3x - 1$

D. $x^2 - 3x - 3$

Understanding

Prescribed Learning Outcomes – B6

49. Determine the remainder in the following division : $\frac{3x^2 - 5x + 2}{x + 2}$

Answer

24

Understanding

Prescribed Learning Outcomes – B6

50. Determine the remainder in the following division : $\frac{4x^3 - x + 5}{x - 3}$

Answer

110

51. Determine the quotient : $(2x^4 + 5x^3 + 2x^2 + 15x - 11) \div (x^2 + 3)$
- A. $2x^2 - 1$
 - B. $2x^2 - x + 3$
 - * C. $2x^2 + 5x - 4$
 - D. $2x^2 + 5x + 4$

52. If the area of a triangle is $x^3 + x^2 - 4x - 4$ and the height is $2x + 2$, determine an expression for the base.
- * A. $x^2 - 4$
 - B. $2x^2 - 8$
 - C. $\frac{x^2 - 4}{2}$
 - D. $x^2 - 2$

B PATTERNS AND RELATIONS <i>(Variables and Equations)</i>	B7 determine equivalent forms of simple rational expressions with polynomial numerators, and denominators that are factorable monomials, binomials, or trinomials
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Knowledge

Prescribed Learning Outcomes – B7

53. Simplify : $\frac{(x+1)(x+2)}{(x+3)(x+1)}$, where $x \neq -1, -3$

A. $\frac{2}{3}$

* B. $\frac{x+2}{x+3}$

C. $\frac{x^2+2}{x^2+3}$

D. $\frac{x^2+3x+2}{x^2+4x+3}$

Understanding

Prescribed Learning Outcomes – B7

54. Simplify for all permissible values : $\frac{x^2-6x+8}{x^2-4}$

* A. $\frac{x-4}{x+2}$

B. $\frac{x+4}{x-2}$

C. $\frac{x-4}{x-2}$

D. $\frac{x+4}{x+2}$

Understanding

Prescribed Learning Outcomes – B7

55. Simplify for all permissible values : $\frac{8a^6 - 20a^4}{2a^2}$

- A. $4a^6 - 20a^4$
- * B. $4a^4 - 10a^2$
- C. $4a^3 - 10a^2$
- D. $6a^4 - 18a^2$

Understanding

Prescribed Learning Outcomes – B7

56. Simplify : $\frac{2x^2 - 8x - 24}{x - 6}$, where $x \neq 6$

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

Understanding

Prescribed Learning Outcomes – B7

57. Simplify for all permissible values : $\frac{x^2 - 16x + 48}{x^2 + 2x - 24}$

- * A. $\frac{x - 12}{x + 6}$
- B. $\frac{x - 12}{x - 6}$
- C. $\frac{x + 12}{x + 6}$
- D. $\frac{x + 12}{x - 6}$

58. Given that both rational expressions are defined, what is the value of k ?

$$\frac{2x^2 - x + k}{3x^2 - x - 2} = \frac{2x + 1}{3x + 2}$$

- A. -2
- * B. -1
- C. 1
- D. 2

B PATTERNS AND RELATIONS <i>(Variables and Equations)</i>	B8 determine the non-permissible values for the variable in rational expressions with polynomial numerators, and denominators that are factorable monomials, binomials, or trinomials
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Knowledge

Prescribed Learning Outcomes – B8

59. For which values of x is the following expression undefined?

$$\frac{x(x+4)(x-3)}{(x-4)(x-3)}$$

- A. -4, 0
- B. -4, 0, 3
- * C. 3, 4
- D. 4

Understanding

Prescribed Learning Outcomes – B8

60. How many non-permissible values are there for the following rational expression?

$$\frac{x^2 - 2x - 15}{2x^2 - 8x - 10}$$

- A. 0
- B. 1
- * C. 2
- D. 3

61. For which value(s) of b is the following expression undefined?

$$\frac{b^2 + 3b - 10}{b^2 - 25}$$

- * A. $-5, 5$
B. $-5, 2, 5$
C. $2, 5$
D. 5

62. In the expression $\frac{y^2 - 1}{(y^2 + y + k)(y + k)}$ the non-permissible values of y are $2, -3$, and 6 .

What is the value of k ?

- * A. -6
B. -2
C. 1
D. 3

B PATTERNS AND RELATIONS <i>(Variables and Equations)</i>	B9 perform the operations of addition, subtraction, multiplication, and division on rational expressions with polynomial numerators, and denominators that are monomials, binomials, or trinomials
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Knowledge

Prescribed Learning Outcomes – B9

63. Simplify : $\frac{x}{x+3} + \frac{1}{x+3}$, where $x \neq -3$

- * A. $\frac{x+1}{x+3}$
- B. $\frac{x+1}{2x+6}$
- C. $\frac{x+1}{x^2+9}$
- D. $\frac{x+1}{x^2+6x+9}$

Understanding

Prescribed Learning Outcomes – B9

64. Simplify for all permissible values : $\frac{5a}{a+1} - \frac{2}{a}$

- * A. $\frac{5a^2 - 2a - 2}{a(a+1)}$
- B. $\frac{5a^2 - 2a + 2}{a(a+1)}$
- C. $\frac{5a^2 - 2a - 1}{a(a+1)}$
- D. $\frac{5a^2 - 2a + 1}{a(a+1)}$

65. Simplify for all permissible values : $\frac{3a+1}{2a} - \frac{2a-3}{a}$

- * A. $\frac{-a+7}{2a}$
B. $\frac{-a-5}{2a}$
C. $\frac{-a-2}{2a}$
D. $\frac{-a+4}{2a}$

66. Simplify for all permissible values : $\frac{5}{a+1} - \frac{2a-3}{a+1} + \frac{4a+5}{a-2}$

- * A. $\frac{2a^2 + 21a - 11}{(a-2)(a+1)}$
B. $\frac{2a^2 + 7a - 11}{(a-2)(a+1)}$
C. $\frac{2a^2 + 21a + 1}{(a-2)(a+1)}$
D. $\frac{2a^2 + 7a + 1}{(a-2)(a+1)}$

67. Simplify for all permissible values : $\frac{2x}{2x^2 - 5x - 3} + \frac{1}{x - 3}$

A. $\frac{2x + 1}{(x - 3)(2x + 1)}$

* B. $\frac{4x + 1}{(x - 3)(2x + 1)}$

C. $\frac{2x}{(x - 3)(2x + 1)}$

D. $\frac{2}{x - 3}$

68. Simplify for all permissible values : $\frac{3x^3 + 9x^2}{2x^2 + 2x - 12} \times \frac{4x - 8}{6x}$

* A. x

B. $\frac{1}{x}$

C. $\frac{1}{4x}$

D. $4x$

69. Simplify for all permissible values : $\frac{4x^3 - x}{2x^2 - 5x - 3} \div \frac{2x^3 - 9x^2 + 4x}{x^2 + 3x - 18}$

- * A. $\frac{x+6}{x-4}$
- B. $\frac{x+6}{x+4}$
- C. $\frac{x-6}{x-4}$
- D. $\frac{x-6}{x+4}$

70. Simplify : $\frac{\frac{2}{x} - \frac{1}{2}}{\frac{3}{x} - \frac{1}{2}}$, where $x \neq 0$

- * A. $\frac{x-4}{x-6}$
- B. $\frac{x+4}{x+6}$
- C. $\frac{2}{3}$
- D. $\frac{3}{2}$

B PATTERNS AND RELATIONS <i>(Variables and Equations)</i>	B10 find and verify the solutions of rational equations that reduce to linear form
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Knowledge

Prescribed Learning Outcomes – B10

71. Solve: $\frac{8}{x-2} = 4$

- A. 0
- B. $\frac{1}{4}$
- C. $\frac{1}{2}$
- * D. 4

Understanding

Prescribed Learning Outcomes – B10

72. Solve: $\frac{3x+4}{2x+7} = \frac{3x-4}{2x-3}$

- A. $-\frac{8}{7}$
- * B. $\frac{8}{7}$
- C. $\frac{4}{3}$
- D. $\frac{10}{3}$

73. Solve: $\frac{5}{3m-1} - \frac{1}{4} = \frac{m}{3m-1}$

- A. 1
- B. $\frac{19}{7}$
- * C. 3
- D. $\frac{21}{4}$

74. Solve: $\frac{5}{x^2 - x - 20} = \frac{3}{x+4} - \frac{7}{x-5}$

Answer

-12

75. Sophie and Hypatia are sisters who both attend the same high school. Sophie walks to school, and Hypatia cycles to school at an average speed five times as fast as Sophie's average speed. If they leave home together and travel the 3 km distance to school, Hypatia arrives 30 min ahead of Sophie. What is Sophie's average speed?

- A. Sophie's speed is 0.88 km/h.
- B. Sophie's speed is 0.8 km/h.
- * C. Sophie's speed is 4.8 km/h.
- D. Sophie's speed is 5.63 km/h.

<p>B PATTERNS AND RELATIONS <i>(Relations and Functions)</i></p>	<p>B11 describe a linear function in terms of</p> <ul style="list-style-type: none"> – ordered pairs – a rule, in word or equation form – a graph
---	---

Knowledge

Prescribed Learning Outcomes – B11

76. Which of the following represents a linear function?

- * A. $y = x + 1$
- B. $y = \frac{1}{x} + 1$
- C. $y = x^2 + 1$
- D. $y = \sqrt{x + 1}$

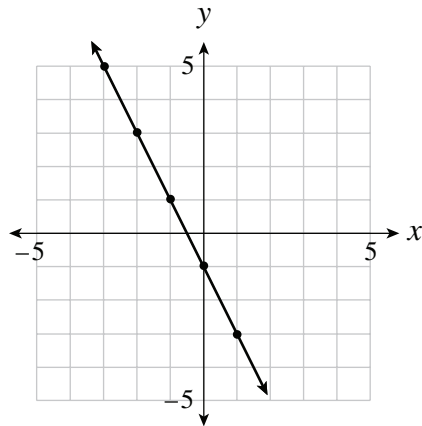
77. Which of the following describe the same linear function?

I.	<table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>-5</td> <td>-14</td> </tr> <tr> <td>-3</td> <td>-10</td> </tr> <tr> <td>0</td> <td>-4</td> </tr> <tr> <td>3</td> <td>2</td> </tr> <tr> <td>5</td> <td>6</td> </tr> </tbody> </table>	x	y	-5	-14	-3	-10	0	-4	3	2	5	6
x	y												
-5	-14												
-3	-10												
0	-4												
3	2												
5	6												
II.	$2x - y - 4 = 0$												
III.	Four less than twice the number.												
IV.													

- A. I and IV only
- B. II and III only
- C. I, III and IV only
- * D. I, II, III and IV

78. Which of the following would be an example of a linear function?
- A. the area of a circle as a function of its radius
 - * B. the cost of a watermelon as a function of mass
 - C. a person's height on a Ferris wheel above the ground as a function of time
 - D. the height above the ground of a ball thrown through the air as a function of time

Use the following graph to answer questions 79 and 80.



Knowledge

Prescribed Learning Outcomes – B12

79. Determine the value of $f(-3)$.

Answer

5

Understanding

Prescribed Learning Outcomes – B12

80. Determine the value of x if $f(x) = -1$.

Answer

0

81. Consider the following functions :

I.	$f(x) = \frac{1}{2}x - 3$
II.	$f(x) = -3x + 5$
III.	$f(x) = 2x + 1$
IV.	$f(x) = -x + 6$

For each function, evaluate $f(2)$ and put the results in order from least to greatest.

	Least \longrightarrow Greatest			
A.	I	II	III	IV
* B.	I	II	IV	III
C.	II	I	III	IV
D.	II	I	IV	III

82. If $f(x) = -2x + 1$, which of the following expressions is $f(x - 3)$?

- A. $x - 2$
- B. $-2x - 2$
- C. $-2x + 5$
- * D. $-2x + 7$

83. Given $f(x) = 2x + 1$, evaluate $f\left(\frac{3}{\sqrt{2}}\right)$.

A. $3\sqrt{2}$

* B. $3\sqrt{2} + 1$

C. $\frac{3\sqrt{2}}{2} + 1$

D. $\frac{7\sqrt{2}}{2}$

<p>B PATTERNS AND RELATIONS <i>(Relations and Functions)</i></p>	<p>B13 determine the following characteristics of the graph of a linear function, given its equation</p> <ul style="list-style-type: none"> – x- and y-intercepts – slope – domain – range <p><i>Clarification: The above characteristics may have to be determined given the graph of a linear equation.</i></p>
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Knowledge

Prescribed Learning Outcomes – B13

84. Determine the slope of the graph of $y = -x - 5$.

Answer

–1

Understanding

Prescribed Learning Outcomes – B13

85. If the domain of $y = \frac{2}{3}x + 1$ is restricted to $-5 \leq x \leq 3$, what is the corresponding range of this function?

A. $-5 \leq y \leq 3$

B. $-\frac{10}{3} \leq y \leq 1$

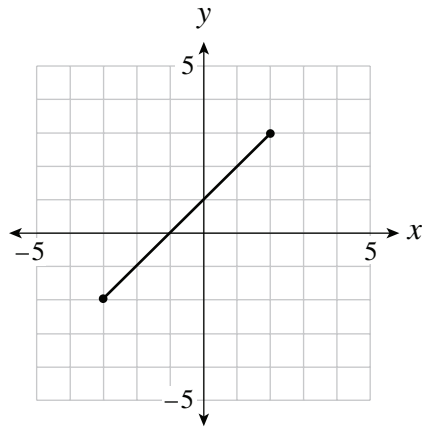
* C. $-\frac{7}{3} \leq y \leq 3$

D. all real numbers

86. Determine the slope and y-intercept of the graph of $3x + 4y = 12$.

	slope	y-intercept
* A.	$-\frac{3}{4}$	3
B.	$\frac{3}{4}$	-3
C.	$-\frac{4}{3}$	4
D.	$\frac{4}{3}$	-4

87. Determine the domain of the following function:



- * A. $-2 \leq x \leq 3$
 B. $-3 \leq x \leq 2$
 C. $\{-3, -2, -1, 0, 1, 2\}$
 D. all real numbers

88. Given a linear function with positive slope and equation $Ax + By + C = 0$, determine the range for the domain $-10 \leq x \leq 10$.

* A. $\frac{10A - C}{B} \leq y \leq \frac{-10A - C}{B}$

B. $\frac{-10A - C}{B} \leq y \leq \frac{10A - C}{B}$

C. $\frac{10A - B}{C} \leq y \leq \frac{-10A - B}{C}$

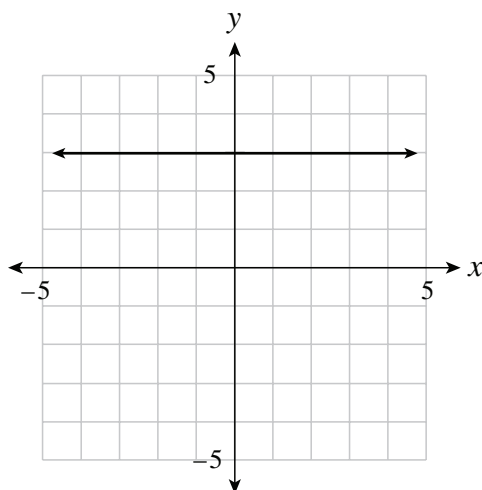
D. $\frac{-10A - B}{C} \leq y \leq \frac{10A - B}{C}$

<p>B PATTERNS AND RELATIONS <i>(Relations and Functions)</i></p>	<p>B14 sketch the graph of a linear function given its equation in the form</p> <ul style="list-style-type: none"> – $ax + by + c = 0$ (general form) – $y = mx + b$ (slope–intercept form)
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Knowledge

Prescribed Learning Outcomes – B14

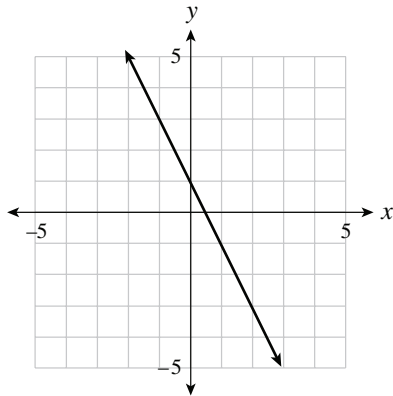
89. Determine the equation of the line graphed below.



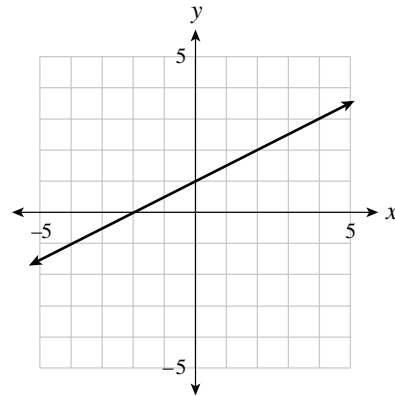
- A. $x + 3 = 0$
- B. $x - 3 = 0$
- C. $y + 3 = 0$
- * D. $y - 3 = 0$

90. Which of the following is the graph of the equation $x - 2y - 1 = 0$?

A.

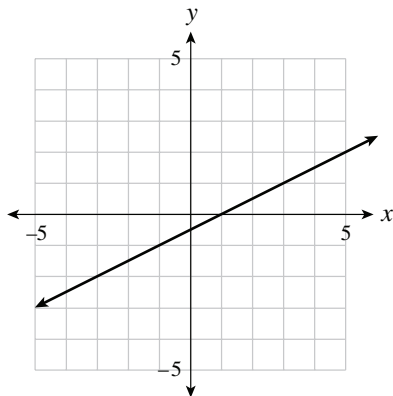


B.

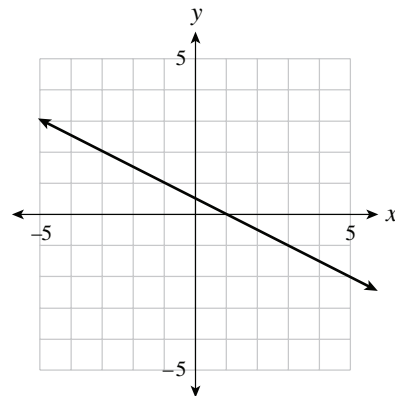


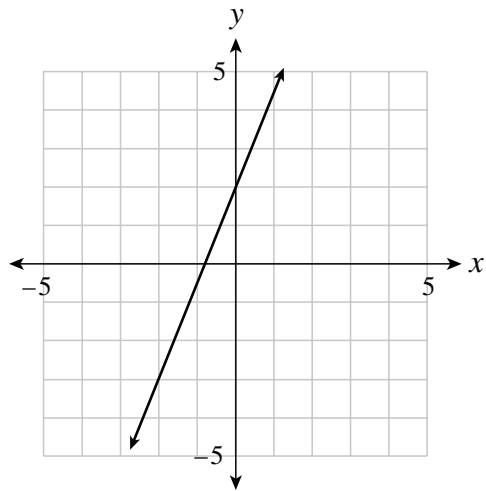
*

C.



D.





91. Determine the equation of the linear function above.

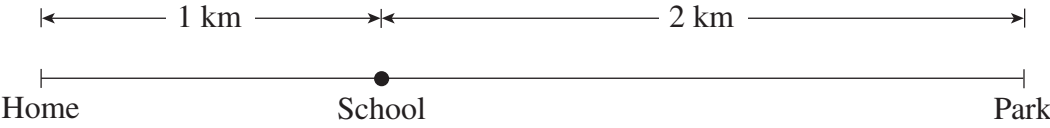
- A. $-2x + 5y + 4 = 0$
- B. $2x - 5y - 4 = 0$
- C. $5x - 2y - 4 = 0$
- * D. $5x - 2y + 4 = 0$

B PATTERNS AND RELATIONS <i>(Relations and Functions)</i>	B15 represent linear data, using linear function models
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Understanding

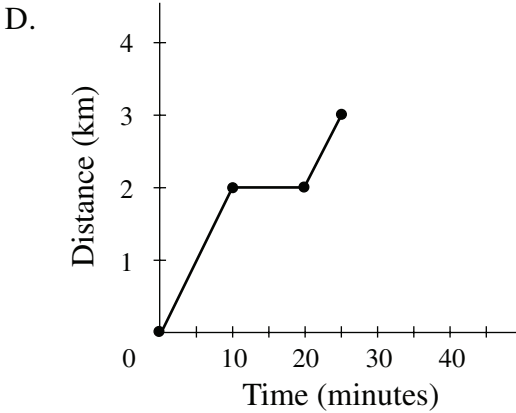
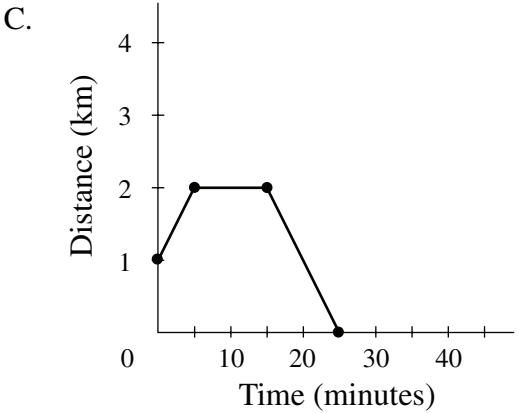
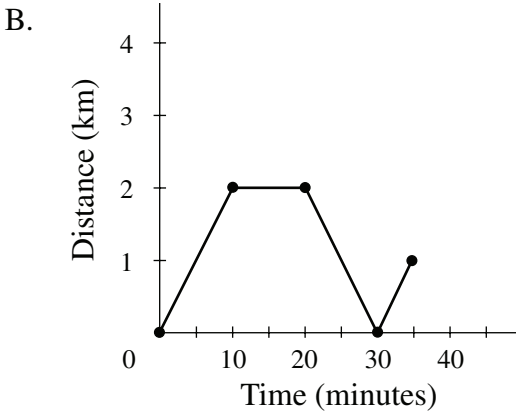
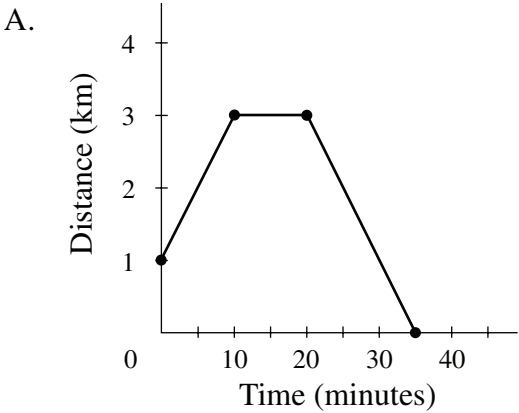
Prescribed Learning Outcomes – B15

92. Sue leaves school and runs to the park. After doing some stretches, she runs home.



Choose the graph that best describes Sue’s distance from home, starting when she leaves school.

*



B PATTERNS AND RELATIONS <i>(Relations and Functions)</i>	B16 solve problems involving partial variation and arithmetic sequences as applications of linear functions
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Knowledge

Prescribed Learning Outcomes – B16

93. UNEEDA Car Rental Company charges a flat rate of \$60 for a car rental plus \$0.15 for each kilometre driven. Which of the following functions determines the overall charge, C , if n kilometres have been driven?

A. $C(n) = 0.15 + 60n$

B. $C(n) = 60 + 0.15(n + 1)$

C. $C(n) = 60 + 0.15(n - 1)$

* D. $C(n) = 60 + 0.15n$

94. A class is going on a field trip. The cost of the bus rental is \$325 and the cost of admission is \$5 per student. Which of the following statements are true?

I.	$y = 10x + 375$, where x is the number of students and y is the total cost of the field trip
II.	The total cost for 20 students is \$425.
III.	This represents a partial variation.
IV.	<p>The graph of the function is :</p>

- * A. II and III only
 B. II and IV only
 C. I, II and III only
 D. I, II and IV only

95. Consider the following information:

- y varies partially as x
- when $x = 2$, $y = 1$
- when $x = 0$, $y = -7$

What is the value of the constant of variation (constant of proportionality)?

Answer

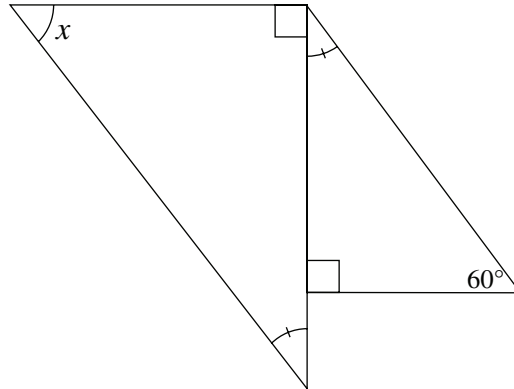
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<p>C SHAPE AND SPACE (Measurement)</p>	<p>C1 solve 2-D and 3-D problems involving two right triangles</p>
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Knowledge

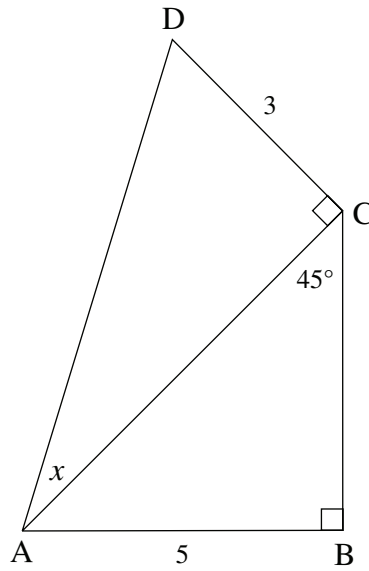
Prescribed Learning Outcomes – C1

96. What is the measure of $\angle x$?



- A. 30°
- B. 45°
- * C. 60°
- D. 90°

97. What is the measure of $\angle x$ to the nearest degree?



Answer

23

Higher Mental Processes

Prescribed Learning Outcomes – C1

98. A window on the fourth floor of a building is 20 m above the ground. From the window, the angle of depression to the base of a nearby building is 31° and the angle of elevation to the top of the building is 40° . How tall is the nearby building to the nearest metre?

Answer

48

C SHAPE AND SPACE (Measurement)	C2 extend the concepts of sine and cosine for angles through to 180°
------------------------------------	---

Knowledge

Prescribed Learning Outcomes – C2

99. What acute angle has the same sine value as $\sin 165^\circ$? Answer in degrees.

Answer

15

Understanding

Prescribed Learning Outcomes – C2

100. Find the value(s) for A , $0^\circ \leq A \leq 180^\circ$, when $\sin A = 0.866$.

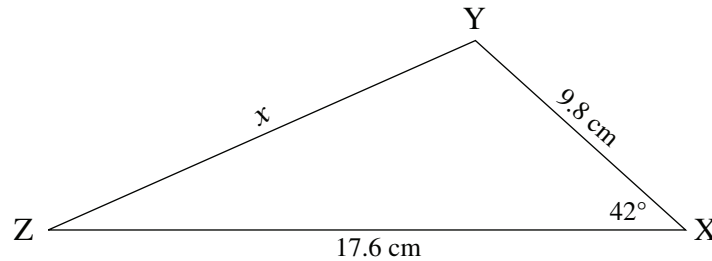
- A. 30°
- B. 60°
- C. $30^\circ, 150^\circ$
- * D. $60^\circ, 120^\circ$

C SHAPE AND SPACE (Measurement)	C3 apply the sine and cosine laws to solve problems (excluding the ambiguous case)
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Knowledge

Prescribed Learning Outcomes – C3

101. Which of the following would be used to solve for side x in the fewest steps?



- A. Sine Law
- * B. Cosine Law
- C. Distance Formula
- D. Pythagorean Theorem

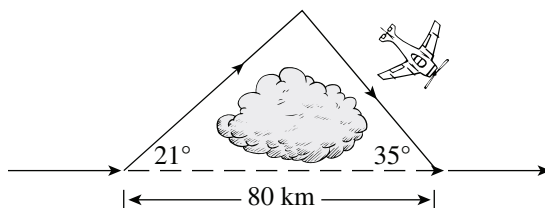
Understanding

Prescribed Learning Outcomes – C3

102. A triangle has sides of length 7.5 m, 8.2 m and 9.7 m. What is the measure of the angle between the shortest and longest sides?

- A. 15°
- * B. 55°
- C. 57°
- D. 75°

103. A pilot decides to detour around a group of thunderclouds, as shown in the diagram below. He turns the plane at an angle of 21° to its original path, flies for a while, turns and intersects the original path at an angle of 35° , 80 km from where the plane left the original path.



How much farther was the detour route than the original route?

- A. 6.65 km
 * B. 9.93 km
 C. 24.65 km
 D. 89.93 km

Higher Mental Processes

Prescribed Learning Outcomes – C3

104. A parallelogram has diagonals that are 14 cm and 20 cm long. If one angle formed by the intersection of the diagonals is 50° , what is the perimeter of the parallelogram?

- A. 23.14 cm
 B. 30.72 cm
 * C. 46.28 cm
 D. 92.56 cm

Higher Mental Processes

Prescribed Learning Outcomes – C3

105. A ship travels due west for 550 km then travels $N40^\circ W$ (bearing 320°) for 700 km. How far is the ship from its starting point?

- A. 450 km
 B. 890 km
 * C. 1135 km
 D. 1250 km

C SHAPE AND SPACE (3-D Objects and 2-D Shapes)	C4 solve problems involving distances between points in the coordinate plane
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Knowledge

Prescribed Learning Outcomes – C4

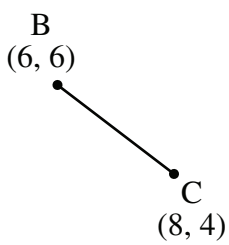
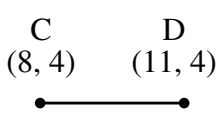
106. Which of the following is used to derive the distance formula?

- A. Sine Law
- B. Slope Formula
- C. Midpoint Formula
- * D. Pythagorean Theorem

Understanding

Prescribed Learning Outcomes – C4

Use the following information to answer question 107.

line segment \overline{BC}	line segment \overline{CD}
 <p>B (6, 6)</p> <p>C (8, 4)</p>	 <p>C (8, 4)</p> <p>D (11, 4)</p>

107. Which of the following statements is correct?

- A. The length of line segment \overline{BC} is greater.
- * B. The length of line segment \overline{CD} is greater.
- C. The lengths of both segments are equal.
- D. The relationship cannot be determined from the information given.

108. A fishing boat is located 5 km west and 2 km north of Tofino. A kayak is located 2 km west and 3 km south of Tofino. How far apart, in kilometres, are the two boats?
Answer to two decimal places.

Answer

5.83

109. Which of the following represents an expression for the distance between the points $(2a, -b)$ and $(3a, 2b)$?

A. $a + 3b$

B. $-a + 3b$

* C. $\sqrt{a^2 + 9b^2}$

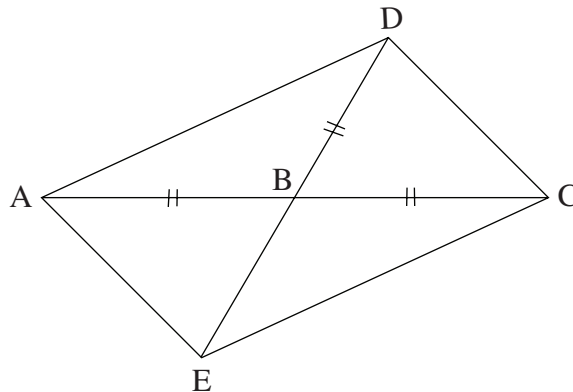
D. $\sqrt{-a^2 - 9b^2}$

<p>C SHAPE AND SPACE (3-D Objects and 2-D Shapes)</p>	<p>C5 solve problems involving midpoints of line segments</p>
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Knowledge

Prescribed Learning Outcomes – C5

110. Which of the following statements is supported by the diagram?



- * A. B is the midpoint of \overline{AC}
- B. $(\overline{BD})^2 + (\overline{BC})^2 = (\overline{DC})^2$
- C. B is the midpoint of \overline{DE}
- D. \overline{AC} is perpendicular to \overline{ED}

Understanding

Prescribed Learning Outcomes – C5

111. Determine the midpoint between $(-3, 7)$ and $(9, -3)$.

- A. $(3, -2)$
- * B. $(3, 2)$
- C. $(6, -5)$
- D. $(6, 5)$

112. Determine the endpoint of a line segment with midpoint $(2, 2)$ and the other endpoint $(7, 5)$.
- * A. $(-3, -1)$
 - B. $(2.5, 1.5)$
 - C. $(4.5, 3.5)$
 - D. $(5, 3)$

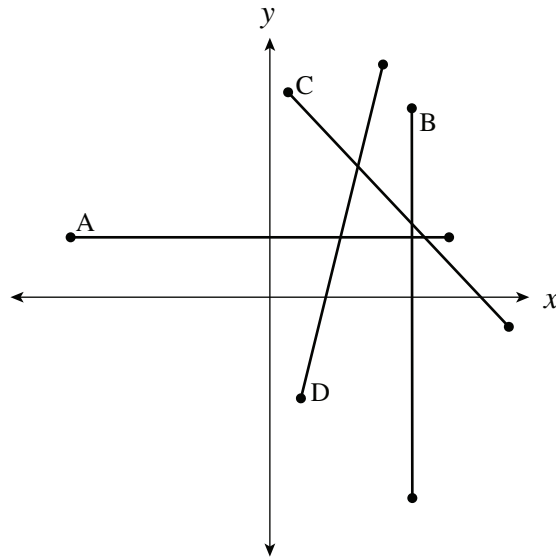
113. Which of the following statements is always true?
- A. Two line segments with equal lengths have the same midpoint.
 - B. Two line segments with the same midpoint are the same length.
 - C. A point equidistant from the endpoints of a line segment is the midpoint.
 - * D. The midpoint of a line segment is equidistant from the endpoints of the line segment.

C SHAPE AND SPACE <i>(3-D Objects and 2-D Shapes)</i>	C6 solve problems involving rise, run, and slope of line segments
---	--

Knowledge

Prescribed Learning Outcomes – C6, C8

Use the graph below to answer questions 114 to 119.



114. Which line segment has a slope of zero?

- * A. A
- B. B
- C. C
- D. D

115. Which line segment has an undefined slope?

- A. A
- * B. B
- C. C
- D. D

116. Which line segment has a positive slope?

- A. A
- B. B
- C. C
- * D. D

117. For which line segment is $m < 0$, where m is slope?

- A. A
- B. B
- * C. C
- D. D

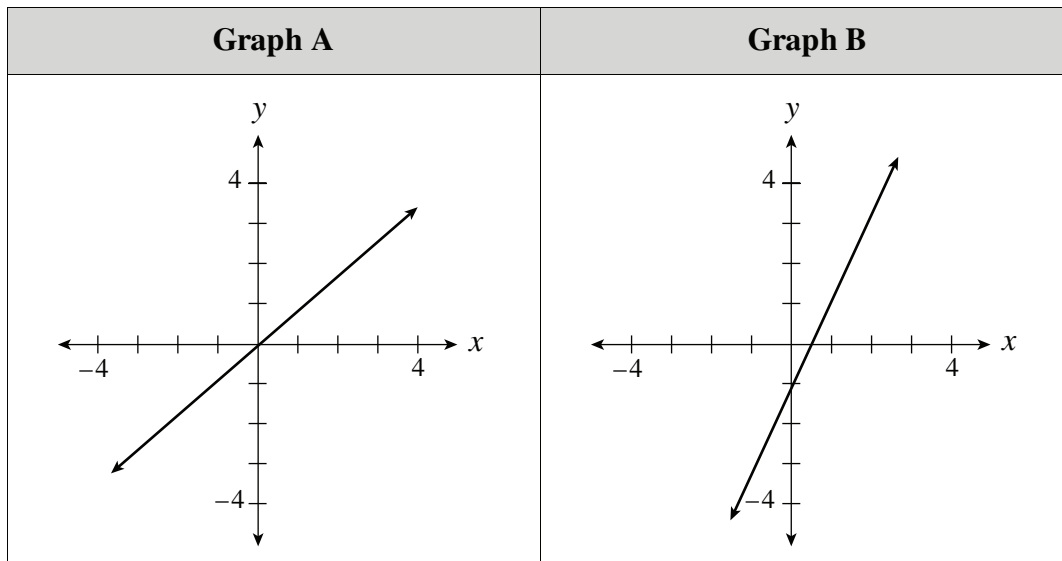
118. Which line segment is perpendicular to line segment A?

- A. A
- * B. B
- C. C
- D. D

119. Which line segment is parallel to the x -axis?

- * A. A
- B. B
- C. C
- D. D

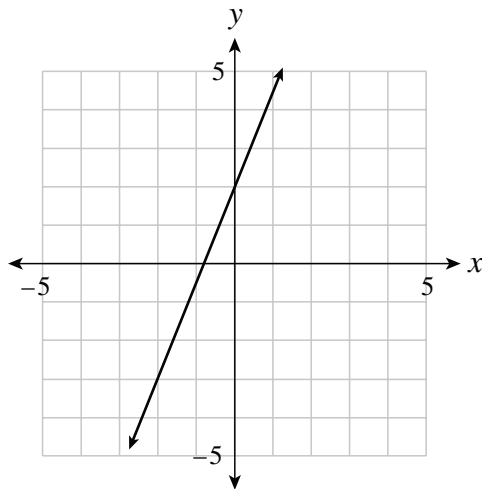
Use the following graphs to answer question 120.



120. Which of the following statements is correct about the slopes of the lines?

- A. The slopes in both graphs are equal.
- * B. The slope of the line in graph A is less than the slope of the line in graph B.
- C. The slope of the line in graph A is greater than the slope of the line in graph B.
- D. The relationship cannot be determined from the graphs.

121. Determine the slope of the line shown on the graph.



Answer

2.5

122. Determine the slope of a line segment joining $(-4, 8)$ to $(2, 2)$.

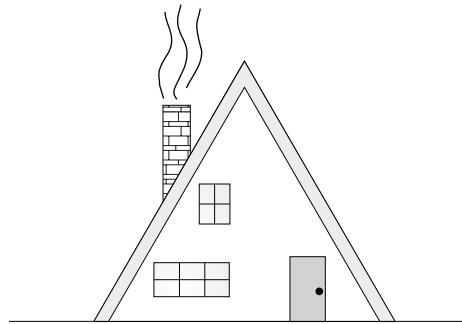
Answer

-1

123. If the slope of a ski hill is $\frac{1}{3}$ and the coordinates of the bottom of the hill are $(2, 5)$, what is the value of y if the coordinates at the top of the hill are $(8, y)$?

- A. 3
 * B. 7
 C. 11
 D. 23

124. The slope of the roof of an A-frame cottage is $\frac{3}{4}$.



How high, in metres, is the peak of the cottage, given that the total width of the cottage is 10 m?
 Answer to two decimal places.

Answer

3.75

<p>C SHAPE AND SPACE (3-D Objects and 2-D Shapes)</p>	<p>C7 determine the equation of a line, given information that uniquely determines the line</p>
---	---

Knowledge

Prescribed Learning Outcomes – C7

125. Which of the following equations represents a line that has a slope of $\frac{3}{4}$ and has a y-intercept of -5 ?

A. $y = -\frac{4}{3}x - 5$

B. $y = \frac{3}{4}x$

* C. $y = \frac{3}{4}x - 5$

D. $y = \frac{3}{4}x + 5$

Understanding

Prescribed Learning Outcomes – C7

126. Determine the equation of the line that has a slope of -1 and passes through $(3, 4)$.

A. $y = -x - 7$

* B. $y = -x + 7$

C. $y = -x - 1$

D. $y = -x + 1$

127. Determine the equation of the line that passes through (6, 5) and (–9, –5).

- * A. $y = \frac{2}{3}x + 1$
- B. $y = \frac{2}{3}x + 3$
- C. $y = \frac{2}{3}x + 9$
- D. $y = \frac{3}{2}x - 4$

128. The equation of a line is $2x - ay + c = 0$. The line has a slope of $-\frac{2}{3}$ and passes through (–6, 2).

Determine the value of c .

- A. $c = -18$
- B. $c = -6$
- * C. $c = 6$
- D. $c = 18$

<p>C SHAPE AND SPACE (3-D Objects and 2-D Shapes)</p>	<p>C8 solve problems using slopes of: – parallel lines – perpendicular lines</p>
---	--

Knowledge

Prescribed Learning Outcomes –C8

129. Determine the equation of a line that is parallel to the line $y = -\frac{3}{2}x + 1$.

- * A. $y = -\frac{3}{2}x - 1$
- B. $y = -\frac{2}{3}x - 2$
- C. $y = \frac{2}{3}x - 3$
- D. $y = \frac{3}{2}x - 4$

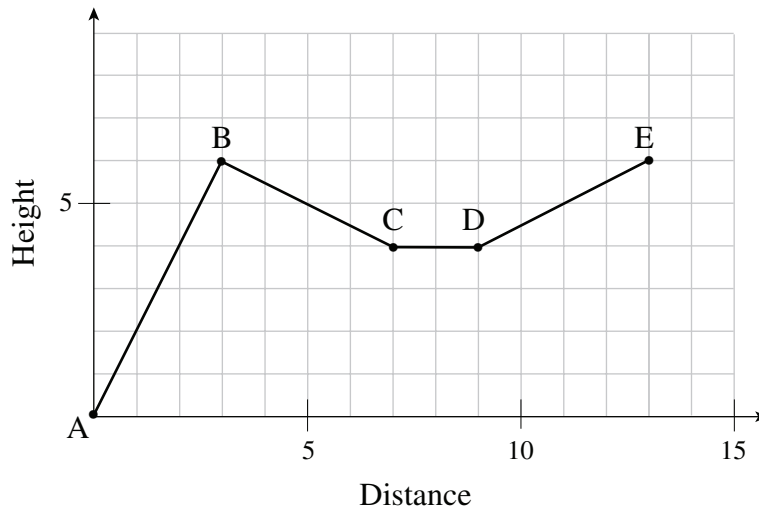
Understanding

Prescribed Learning Outcomes –C8

130. Determine the equation of a line that is perpendicular to the line $y = -\frac{3}{2}x + 1$.

- A. $y = -\frac{3}{2}x - 1$
- B. $y = -2x + 1$
- C. $y = -x + 7$
- * D. $y = \frac{2}{3}x + 1$

Use the following graph to answer question 131.



131. Which of the following statements are true?

I.	The slope of \overline{AB} is 2.
II.	The slope of \overline{CD} is 0.
III.	\overline{AB} is perpendicular to \overline{BC} .
IV.	The slope of \overline{CD} is undefined.

- A. I and III only
 B. III and IV only
 * C. I, II and III only
 D. I, III and IV only

132. A line segment joins A(6, 2) and B(14, 12). What are the slope and y-intercept of the line perpendicular to \overline{AB} and passing through the midpoint of \overline{AB} ?

	slope	y-intercept
A.	$-\frac{4}{5}$	-1
* B.	$-\frac{4}{5}$	15
C.	$\frac{5}{4}$	5
D.	$\frac{5}{4}$	9

133. Which of the following is always true?

- A. The product of the slopes of parallel lines is -1 .
- B. The product of the slopes of perpendicular lines is 1 .
- * C. The slope of a line where the x -intercept and the y -intercept have opposite non-zero values is 1 .
- D. The slope of a line where the x -intercept and the y -intercept have the same non-zero values is 1 .