C PATTERNS AND RELATIONS (*Relations and Functions*)	C18 determine the following characteristics of the graph of a linear function, given its equation: – intercepts – slope – domain – range

Knowledge *Prescribed Learning Outcomes – C18*

108. The slope of the graph of $y = -x - 5$ is -5.

A. True
* B. False

$m = -1$

Use the following equation to answer questions 109 to 113.

$$2x + y - 4 = 0$$

Match each graphing Characteristic of the equation on the left with the correct Value(s) on the right. Each Value may be used once, more than once or not at all.

Characteristic	Value(s)
109. y-intercept	A. 2
110. x-intercept	B. 4
111. slope	C. $-2x$
~~112. domain~~	D. -2
~~113. range~~	E. all real numbers
	F. $-2 \leq x \leq 2$
	G. $0 \leq y \leq 8$
	H. -4

x	y	
0	4	(y-int)
2	0	(x-int)

$y = -2x + 4$

$m = -2$

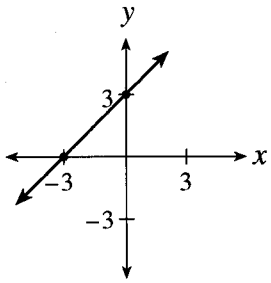
$b = 4$ (y-int)

Answers

109. B
110. A
111. D
~~112. E~~
~~113. E~~

Match each Graph on the left with the correct Equation on the right.
Each Equation may be used once, more than once or not at all.

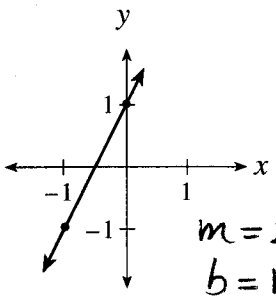
Example:



and $x - y + 3 = 0$

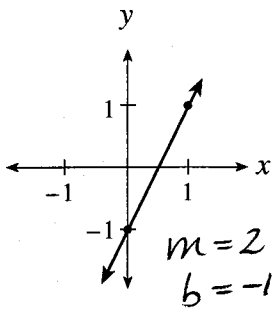
Graph	Equation

114.



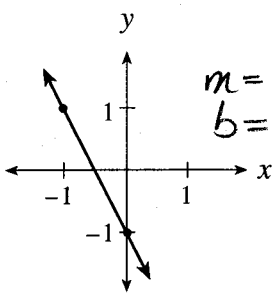
$m = 2$
$b = 1$

115.



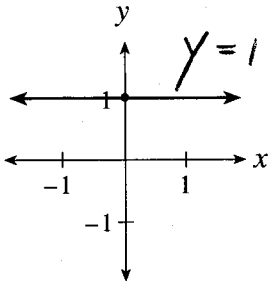
$m = 2$
$b = -1$

116.



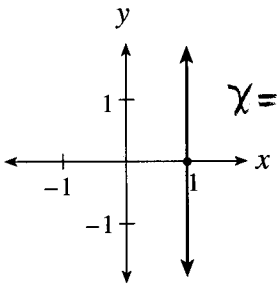
$m = -2$
$b = -1$

117.



$y = 1$

118.



$x = 1$

A. $2x - y - 1 = 0$
$2x - 1 = y$

B. $2x - y + 1 = 0$
$2x + 1 = y$

C. $2x + y + 1 = 0$
$y = -2x - 1$

D. $x - 2y + 1 = 0$
$\frac{x}{2} + \frac{1}{2} = y$

E. $x - 2y - 1 = 0$
$\frac{x}{2} - \frac{1}{2} = y$

F. $x + 2y + 1 = 0$
$-\frac{x}{2} - \frac{1}{2} = y$

G. $y - 1 = 0$
$y = 1$

H. $x - 1 = 0$
$x = 1$

Answers

114. B
115. A
116. C
117. G
118. H

C PATTERNS AND RELATIONS (*Relations and Functions*)	C19 use partial variation and arithmetic sequences as applications of linear functions

Knowledge *Prescribed Learning Outcomes – C19; A4*

119. 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 is a function which will determine the overall charge if n kilometres have been driven?

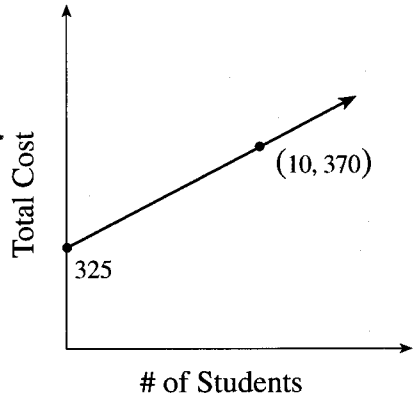
A. $C(n) = 0.15 + 60n$

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

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

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

120. 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. {has a y value greater than 0} - functions unit
IV.	The graph of the function is: 

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

$C(s) = 5s + 325$

121. 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

4

Functions

D	SHAPE AND SPACE (*3-D Objects and 2-D Shapes*)	D6	solve problems involving distances between points in the coordinate plane

Knowledge *Prescribed Learning Outcomes – D6*

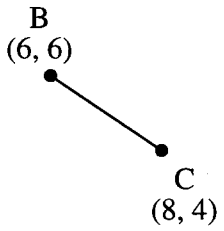
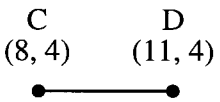
144. Which of the following is used to derive the distance formula?

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

$\sqrt{(x_2-x_1)^2+(y_2-y_1)^2} = \sqrt{a^2+b^2} = c$

Understanding *Prescribed Learning Outcomes – D6*

Use the following information to answer question 145.

Line Segment $\overline{BC}$	Line Segment $\overline{CD}$
	

145. 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 in both columns are equal.
D. The relationship cannot be determined from the information given.

$l_{\overline{BC}} = \sqrt{(-2)^2+2^2}$

$l_{\overline{BC}} = \sqrt{8}$

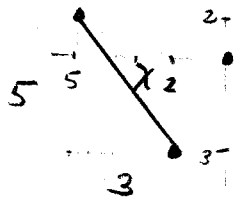
$l_{\overline{CD}} = \sqrt{(3)^2+(0)^2}$

$l_{\overline{CD}} = \sqrt{9}$ (Bigger)

146. 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



$x = \sqrt{5^2 + 3^2}$

$x = \sqrt{34} = 5.83$

Higher Mental Processes *Prescribed Learning Outcomes – D6*

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

$\ell = \sqrt{(3a - 2a)^2 + (2b + b)^2}$

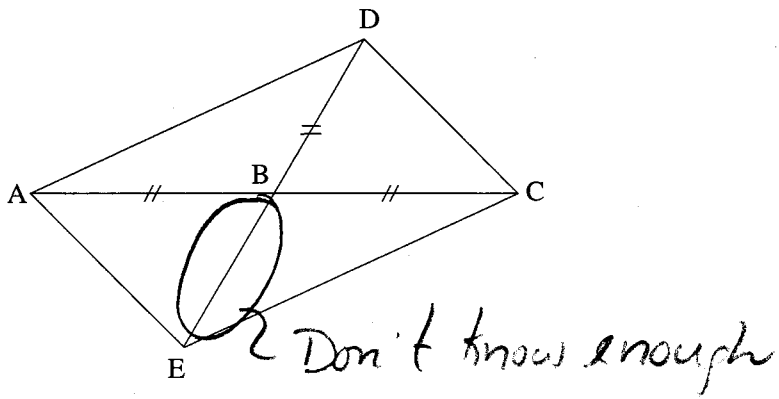
$\ell = \sqrt{a^2 + (3b)^2}$

$\ell = \sqrt{a^2 + 9b^2}$

D SHAPE AND SPACE (*3-D Objects and 2-D Shapes*)	D7 solve problems involving midpoints of line segments

Knowledge *Prescribed Learning Outcomes – D7*

148. Which one of the following statements is supported by the diagram?



* A. B is the midpoint of AC

B. $(BD)^2 + (BC)^2 = (DC)^2$

C. B is the midpoint of DE

D. AC is perpendicular to ED

Match each Description on the left with the correct Coordinate on the right.
Each Coordinate may be used once, more than once or not at all.

Description	Coordinate
149. Midpoint between $(2, 3)$ and $(6, 5)$	A. $(4, 4)$
150. Midpoint between $(-3, 7)$ and $(9, -3)$	B. $(6, 5)$
151. Endpoint of a line segment with midpoint $(2, 2)$ and other endpoint $(7, 5)$	C. $(4, 1)$
152. Endpoint of a line segment with midpoint $(-1, 2)$ and other endpoint $(1, 5)$	D. $(-3, -1)$
	E. $(-6, 5)$
	F. $(1, 4)$
	G. $(3, 2)$

Answers

149. A
150. G
151. D
152. D

149 $M = \left(\frac{2+6}{2}, \frac{3+5}{2}\right)$

$M = (4, 4)$

150. $M = \left(\frac{-3+9}{2}, \frac{7-3}{2}\right)$

$M = (3, 2)$

151. $\frac{x+7}{2} = 2$ $\quad \frac{y+5}{2} = 2$

$x + 7 = 4$ $\quad y + 5 = 4$

$x = -3$ $\quad y = -1$

152 $\frac{x-1}{2} = 1$ $\quad \frac{y+5}{2} = 2$

$x - 1 = 2$ $\quad y + 5 = 4$

$x = 3$ $\quad y = -1$

Shade in Bubble A if the statement is always true.
Shade in Bubble B if the statement is sometimes true.
Shade in Bubble C if the statement is never true.

Statements

153. Two line segments with equal lengths have the same midpoint.
154. Two line segments with the same midpoint are the same length.
155. The midpoint of a line segment is equidistant from the endpoints of the line segment.
156. Two line segments with different endpoints have different midpoints.
157. A point equidistant from the endpoints of a line segment is the midpoint.
158. If two line segments have one shared endpoint and the same midpoint, the other endpoints may be different.

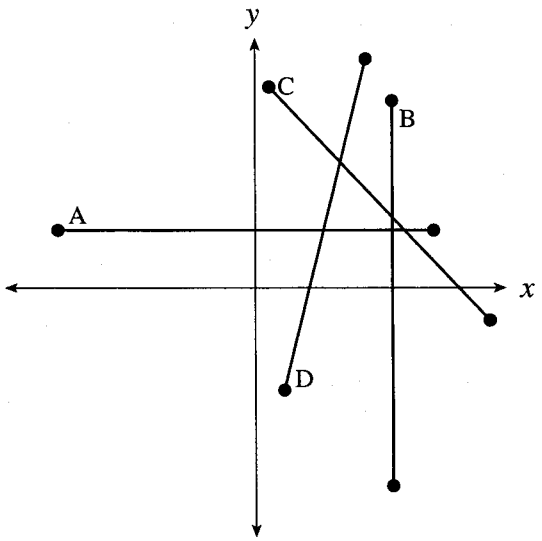
Answers

153. B
154. B
155. A
156. B
157. B
158. C

D SHAPE AND SPACE *(3-D Objects and 2-D Shapes)*	D8 solve problems involving rise, run and slope of line segments

Knowledge *Prescribed Learning Outcomes – D8, D10*

Match each Line Description on the left with a line on the Graph on the right. Each line on the Graph may be used once, more than once or not at all.

Line Description	Graph
159. A line segment with slope of 0. 160. A line segment with undefined slope. 161. A line segment with positive slope. 162. A line segment with $m < 0$, where m is slope. 163. A line segment perpendicular to A. 164. A line segment parallel to the x-axis.	

Answers

159. A
160. B
161. D
162. C
163. B
164. A

165. 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 $(8,\ y)$?

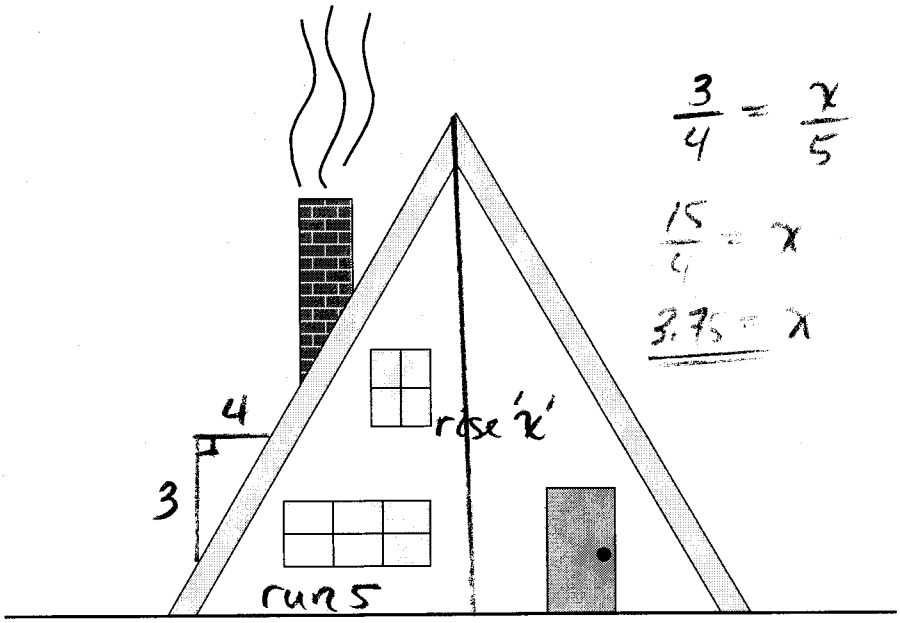
* A. 3
B. 7
C. 11
D. 23

$\frac{y-5}{8-2} = \frac{1}{3} \rightarrow \frac{y-5}{6} = \frac{1}{3} \rightarrow y-5 = 2$
$y = 7$

↳ Can try each value for y & determine slope til you get $\frac{1}{3}$.

Higher Mental Processes *Prescribed Learning Outcomes – D8; A4*

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



$\frac{3}{4} = \frac{x}{5}$

$\frac{15}{4} = x$

$3.75 = x$

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

D	SHAPE AND SPACE (*3-D Objects and 2-D Shapes*)	D9	determine the equation of a line, given information that uniquely determines the line

Knowledge *Prescribed Learning Outcomes – D9*

167. Which of the following equations represents a line that has a slope of $\frac{3}{4}$ and passes through the point $(0, -5)$?

this is the y-intercept in disguise

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

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

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

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

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

OR

$y = \frac{3}{4}x + b$; sub $(0, -5)$

$-5 = \frac{3}{4}(0) + b$

$-5 = b$

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

Match each Description on the left with the correct Equation on the right.
Each Equation may be used once, more than once or not at all.

Description	Equation
168. Line that has a slope of -1 and passes through $(3,\ 4)$	A. $y = x + 7$
169. Line that passes through $(6,\ 5)$ and $(-9,\ -5)$	B. $y = \frac{2}{3}x + 1$
170. Line that passes through $(4,\ 3)$ and is parallel to the line $y = -2x + 4$	C. $y = -2x + 4$
171. Line that is perpendicular to the line $y = -\frac{3}{2}x + 1$	D. $y = -x + 7$
	E. $y = \frac{4}{3}x + 4$
	F. $y = -2x + 11$
	G. $y = -x + 1$
	H. $y = -2x + 1$

168. $4 = -1(3) + b$ $\quad 7 = b$

169 $m = \frac{10}{15} = \frac{2}{3}$ $\quad 5 = \frac{2}{3}(6) + b$ $\quad 1 = b$

170. $3 = -2(4) + b$ $\quad 11 = b$

171 $m = \frac{2}{3}$

Answers

168. D
169. B
170. F
171. B

Higher Mental Processes *Prescribed Learning Outcomes – D9*

Tough!

172. The equation of a line is $2x - ay + c = 0$. The slope is $-\frac{2}{3}$ and the y-intercept is 6. What are the values of a and c?

* A. $a = -3,\ c = -18$
B. $a = -3,\ c = -2$
C. $a = -3,\ c = 2$
D. $a = 3,\ \ c = -18$

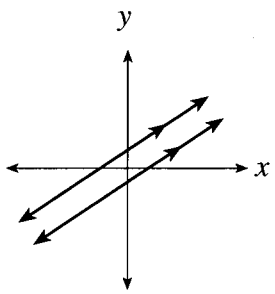
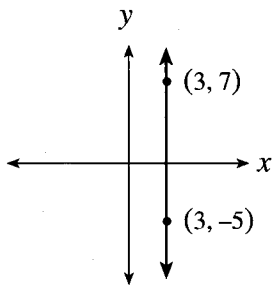
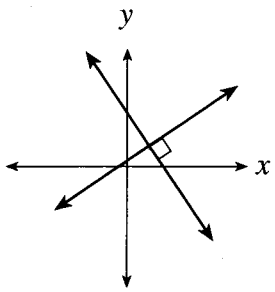
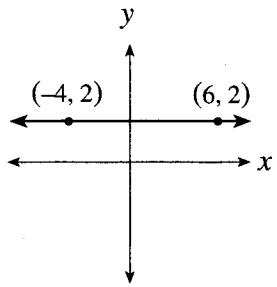
$2x + c = ay$ $\quad \frac{2x}{a} + \frac{c}{a} = y$

$\therefore \frac{2}{a} = -\frac{2}{3}$ $\quad \therefore a = -3$ $\quad \therefore \frac{c}{-3} = 6$ $\quad \therefore c = -18$

D SHAPE AND SPACE (*3-D Objects and 2-D Shapes*)	D10 solve problems using slopes of: – parallel lines – perpendicular lines

Knowledge *Prescribed Learning Outcomes – D10*

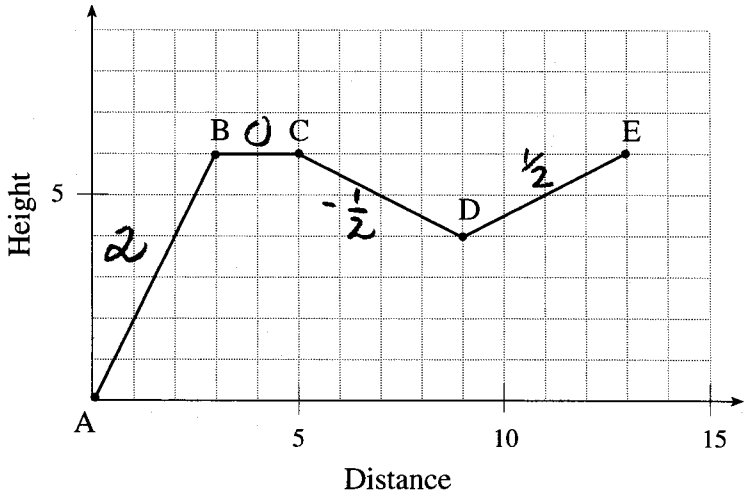
Match each Graph on the left with the correct Characteristic on the right. Each Characteristic may be used once, more than once or not at all.

Graph		Characteristic
173. 	175. 	A. slopes of 1 B. slopes of 0 C. equal slopes D. slopes of –1 E. negative slopes only F. negative reciprocal slopes G. positive reciprocal slopes H. undefined slopes
174. 	176. 	

Answers

173. C
174. F
175. H
176. B

177. The following is a side view of part of the Appleton Roller Coaster.



Which of the following statements are true?

I.	The slope of AB is 2.
II.	The slope of BC is 0.
III.	Line AB is perpendicular to CD.
IV.	The slope of CB is undefined.

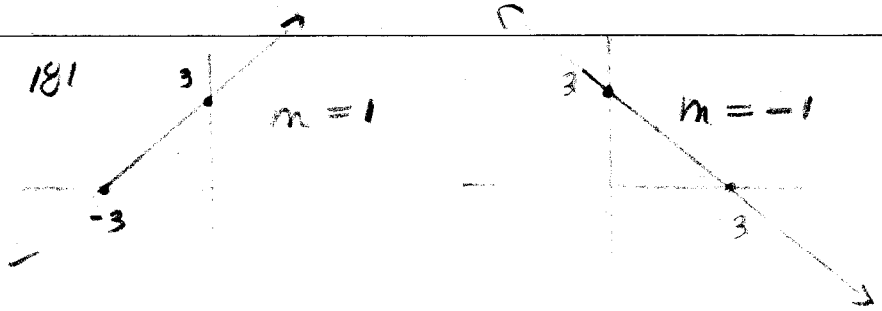
A. I and III only
B. III and IV only
* C. I, II and III only
D. I, II and IV only

Shade in Bubble A if the statement is always true.
Shade in Bubble B if the statement is sometimes true.
Shade in Bubble C if the statement is never true.

Statements
178. The product of the slopes of perpendicular lines is 1. [Product = -1]
179. The product of the slopes of parallel lines is -1.
180. The product of the slopes of parallel lines is 1.
181. The slope of a line where the x-intercept and the y-intercept have opposite non-zero values is 1.
182. The slope of a line where the x-intercept and the y-intercept have the same non-zero values is 1.

Answers

178. C
179. C
180. B
181. A
182. C



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

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

① $m = \frac{10}{8}$

$m = \frac{5}{4}$ $1 - \frac{4}{5}$

② $M_{\overline{AB}} = (10, 7)$

③ $7 = -\frac{4}{5}(0) + b$

$7 = -8 + b$

$15 = b$