

Foundations of Math 11

Final Exam

June 2014

Multiple Choice

- You may use a calculator for the duration of this exam
- Please record answers on the scantron provided
- You may write on this test (this section will be discarded after the test)
- Remember to show all your work in the written section
- Best of Luck!!!

Part A: Multiple Choice Questions

Value: 1 mark each

Suggested Time: 60 minutes

Identify the choice that best completes the statement or answers the question. Fill in the corresponding answer on the scantron provided.

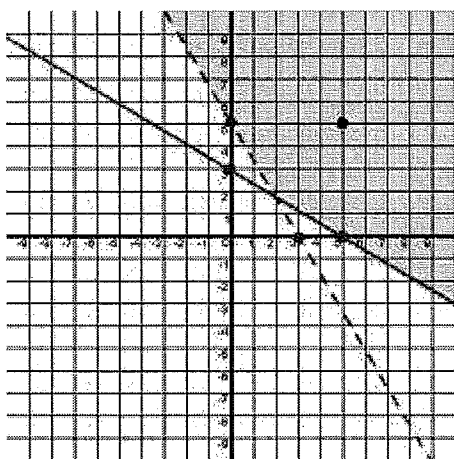
___ 1. How would you graph the solution set for the linear inequality $4y - 2x < 20$?

- a. Draw a dashed boundary line $y = \frac{1}{2}x + 10$, then shade above the line.
- b.** Draw a dashed boundary line $y = \frac{1}{2}x + 10$, then shade below the line.
- c. Draw a solid boundary line $y = \frac{1}{2}x + 10$, then shade below the line.
- d. Draw a solid boundary line $y = \frac{1}{2}x + 10$, then shade above the line.

$< >$ dashed
 $\leq \geq$ solid

no dividing by a negative, so still
 $< =$ less than
 $=$ shade below

___ 2. What system of linear inequalities is shown here?



use dots to find slope

$y \geq -\frac{3}{5}x + 3$
 $y < -\frac{5}{3}x + 5$

$\geq \leq$ solid
 $< >$ dotted.

a. $y > -\frac{3}{5}x + 3$
 $y \geq -\frac{5}{3}x + 5$

c. $y < -\frac{3}{5}x + 3$
 $y \leq -\frac{5}{3}x + 5$

b. $y \geq -\frac{3}{5}x + 3$
 $y > -\frac{5}{3}x + 5$

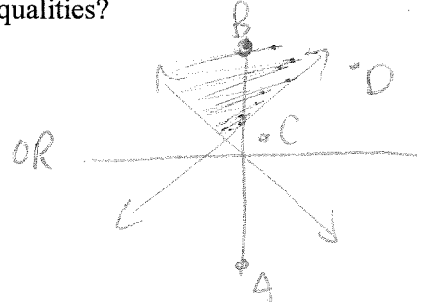
d. $y \leq -\frac{3}{5}x + 3$
 $y < -\frac{5}{3}x + 5$

3. Which test point is in the solution set for the following system of linear inequalities?

$$\{y \geq 2 + x, x + y \geq 0, x \in \mathbb{R}, y \in \mathbb{R}\}$$

- a. (-10, 0)
- b. (0, 10)**
- c. (1, 1)
- d. (10, 10)

$0 \geq 2 + (-10)$	\checkmark	$-10 + 0 \geq 0$	\times
$10 \geq 2 + 0$	\checkmark	$0 + 10 \geq 0$	\checkmark
$1 \geq 2 + 1$	\times	$1 + 1 \geq 0$	\checkmark
$10 \geq 2 + 10$	\times	$10 + 10 \geq 0$	\checkmark



4. A vending machine sells juice and pop.

- The machine holds, at most, 200 cans of drinks.
- Sales from the vending machine show that at least 3 cans of juice are sold for each can of pop.
- Each can of juice sells for \$1.50, and each can of pop sells for \$1.00.

Let x represent the number of cans of pop.

Let y represent the number of cans of juice.

How would you write the objective function for revenue, R ?

- a. $R = x + 1.50y$**
- b. $R = 1.25x + y$
- c. $R = 1.50(x + y)$
- d. $R = 1.50y - x$

value

Revenue = \$1.00 (pop) + \$1.50 (juice)

$$R = x + 1.5y$$

5. A football stadium has 60 000 seats.

- 70% of the seats are in the lower deck. $42\,000$ ($60\,000 \times .70$)
- 30% of the seats are in the upper deck. $18\,000$ ($60\,000 \times .30$)
- At least 40 000 tickets are sold per game.
- A lower deck ticket costs \$100, and an upper deck ticket costs \$60.

Let x represent the number of lower deck tickets.

Let y represent the number of upper deck tickets.

Which of the following is a constraint for this situation?

- a. $y \leq 18\,000$
- b. $y \geq 18\,000$**
- c. None of the above.
- d. $x \leq 18\,000$

$$x \leq 42\,000$$

$$y \leq 18\,000$$

$$x + y \geq 40\,000$$

6. Brent found spiders and grasshoppers in his barn.

- There were at most 12 spiders and at least 10 grasshoppers.
- There were no more than 36 spiders and grasshoppers, in total.

Let s represent the number of spiders and let g represent the number of grasshoppers.

Which inequality represents a restriction of s and g based on the given information?

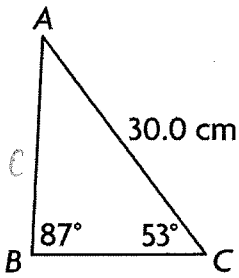
- a. $s + g > 36$
- b. $s - g \leq 36$
- c. $s - g \geq 22$
- d. $s + g \leq 36$**

$$s \leq 12$$

$$g \geq 10$$

$$s + g \leq 36$$

7. Determine the length of c to the nearest tenth of a centimetre.



- a. 23.0 cm
- b. 25.0 cm
- c. 24.0 cm
- d. 26.1 cm

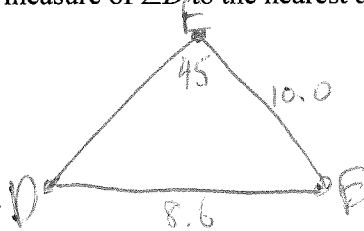
$$\frac{c}{\sin 53} = \frac{30.0 \text{ cm}}{\sin 87}$$

$$c = \frac{30 \sin 53}{\sin 87}$$

$$c = 23.99194$$

8. In $\triangle DEF$, $d = 10.0$ cm, $e = 8.6$ cm, and $\angle E = 45^\circ$. Determine the measure of $\angle D$ to the nearest degree.

- a. 35°
- b. 55°
- c. 45°
- d. 65°



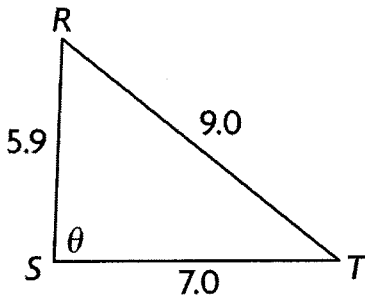
$$\frac{\sin D}{10.0} = \frac{\sin 45}{8.6}$$

$$\sin D = \frac{10 \sin 45}{8.6}$$

$$\sin D = .822217$$

$$\sin^{-1}(.822217) = 55.307^\circ$$

9. Determine the measure of θ to the nearest degree.



- a. 88°
- b. 86°
- c. 84°
- d. 90°

SSS-Cosine Law

$$9^2 = 5.9^2 + 7^2 - 2(5.9)(7)\cos\theta$$

$$\frac{9^2 - 5.9^2 - 7^2}{-2(5.9)(7)} = \cos\theta$$

$$0.034019 = \cos\theta$$

10. In $\triangle LMN$, $l = 27.0$ cm, $m = 31.4$ cm, and $\angle N = 82^\circ$. Determine the measure of n to the nearest tenth of a centimetre.

- a. 39.0 cm
- b. 38.5 cm
- c. 39.5 cm
- d. 38.0 cm

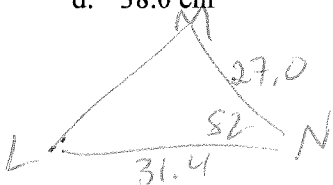
SAS-Cosine Law

$$\cos^{-1}(0.034019) = 88.05^\circ$$

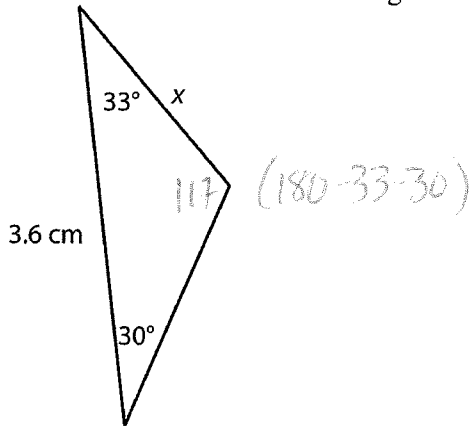
$$n^2 = 27^2 + 31.4^2 - 2(27)(31.4)\cos 82$$

$$n^2 = 1478.978$$

$$n = \sqrt{1478.978} = 38.457$$



11. Determine the unknown side length to the nearest centimetre.



$$\frac{x}{\sin 30} = \frac{3.6}{\sin 117}$$

$$x = \frac{3.6 \sin 30}{\sin 117}$$

$$x = 2.02018$$

- a. 2.5 cm
- b. 1.8 cm
- c. 2.3 cm
- d. 2.0 cm

12. Which set of measurements can produce two possible triangles?

- a. $\angle A = 48^\circ, a = 4.2 \text{ m}, b = 5.0 \text{ m}$
- b. $\angle A = 48^\circ, a = 8.2 \text{ m}, b = 13.0 \text{ m}$
- c. $\angle A = 48^\circ, a = 5.2 \text{ m}, b = 7.0 \text{ m}$
- d. $\angle A = 35^\circ, a = 10.8 \text{ m}, b = 8.0 \text{ m}$

$h = 5 \sin 48 = 3.7 \rightarrow 2$ triangles
 $h = 13 \sin 48 = 9.7 \rightarrow 0$ (a too small)
 $h = 7 \sin 48 = 5.2 \rightarrow 1$ (a = height)
 $h = 8 \sin 35 = 4.6 \rightarrow 1$ (a too big)

13. Determine the mean of the following test scores.

History Test 1 Scores (out of 100)

90	84	77	66
89	84	77	65
86	82	75	65
86	81	72	61
84	79	70	56

- a. 76.45
- b. 79.2
- c. 78.5
- d. 74.25

STAT Edit... L1



STAT CALC

1-Var Stats

$$\bar{x} = \text{mean} = 76.45$$

14. At the end of a bowling tournament, three friends analyzed their scores.
 Erinn's mean bowling score is 92 with a standard deviation of 14.
 Declan's mean bowling score is 130 with a standard deviation of 18.
 Matt's mean bowling score is 116 with a standard deviation of 22.

Who is the more consistent bowler?

smallest standard deviation

- a. Impossible to tell.
- b. Declan
- c. Matt
- d. Erinn

15. Erinn compiled her bowling scores over the last 15 weeks.

124 133 122
 132 145 124
 119 137 143
 140 136 128
 121 141 132

STAT Edit... L1

STAT CALC

1-Var Stats

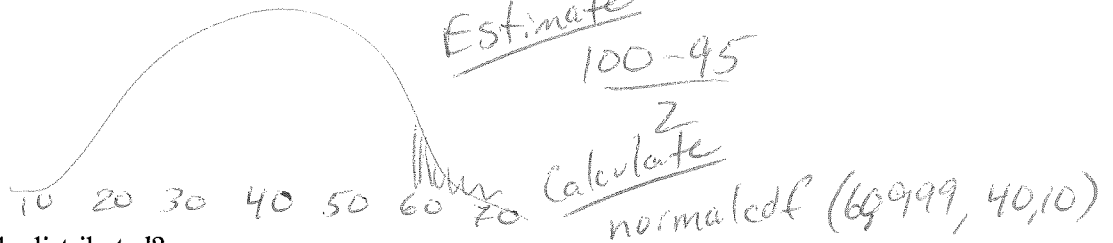
Determine the standard deviation, to one decimal place.

- a. 8.7
- b. 0.0
- c. 8.5
- d. 8.2

*$\sigma_x = \text{standard deviation}$
 $= 8.207313...$*

16. The ages of participants in a bonspiel are normally distributed, with a mean of 40 and a standard deviation of 10 years. What percent of the curlers are older than 60?

- a. 1.25%
- b. 2.5%
- c. 0%
- d. 5%



17. Which set is normally distributed?

Interval	0-9	10-19	20-29	30-39	40-49	50-59
Set A.	84	72	75	75	72	64
Set B.	13	57	91	96	43	20
Set C.	35	35	35	45	55	55
Set D.	64	48	38	72	55	87

bell curve

- a. Set A.
- b. Set B.
- c. Set C.
- d. Set D.

up + down

18. Determine the z-score for the given value.

$$\mu = 510, \sigma = 93, x = 412$$

- a. -0.95
- b. 1.05
- c. 0.95
- d. -1.05

$$z = \frac{x - \mu}{\sigma} = \frac{412 - 510}{93} = -1.05376$$

19. Determine the percent of data to the right of the z-score: $z = -1.96$.

- a. 98.50%
- b. 97.50%
- c. 1.50%
- d. 2.50%

From Chart

0.0250 to the left

$$1 - 0.0250 = 0.975 \text{ to the right}$$

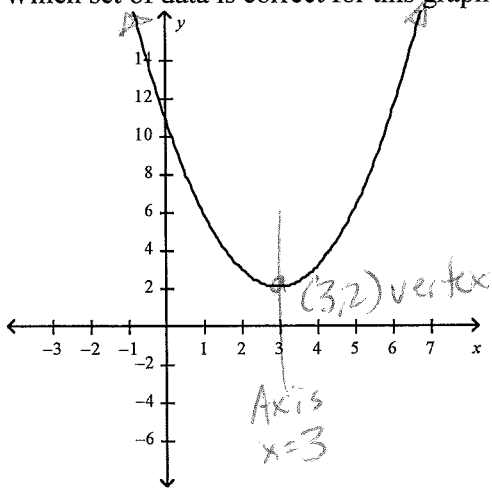
20. A poll was conducted about an upcoming election. The result that 44% of people intend to vote for one of the candidates is considered accurate within ± 2.7 percent points, 19 times out of 20. State the confidence interval.

- a. 41.3%–44%
- b. 42.65%–45.35%
- c. 44%–46.7%
- d. 41.3%–46.7%

$$44 - 2.7 \qquad 44 + 2.7$$

$$41.3 \longrightarrow 46.7$$

21. Which set of data is correct for this graph?



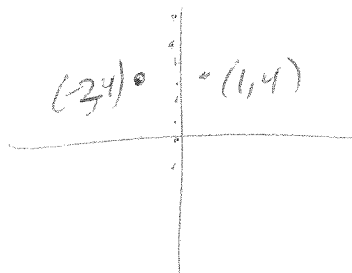
	Axis of Symmetry	Vertex	Domain	Range
<input checked="" type="radio"/> A.	$x = 3$	$(3, 2)$	$x \in \mathbb{R}$	$2 \leq y$ ✓
<input type="radio"/> B.	$x = 3$	$(2, 3)$	$x \in \mathbb{R}$	$y \in \mathbb{R}$
<input type="radio"/> C.	$x = 2$	$(2, 3)$	$-1 \leq x \leq 7$	$2 \leq y$ ✓
<input type="radio"/> D.	$x = 3$	$(3, 2)$	$-2 \leq x \leq 8$	$0 \leq y$

- a. Set A.
 b. Set B.
 c. Set C.
 d. Set D.

Always

22. The points $(-2, 4)$ and $(1, 4)$ are located on the same parabola. What is the equation for the axis of symmetry for this parabola?

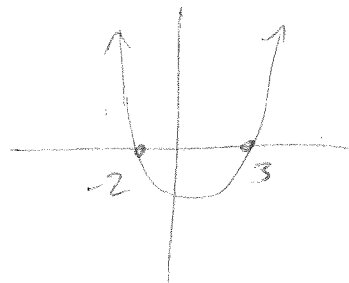
- a. $x = -0.5$
 b. $x = -1$
 c. $x = 0.5$
 d. $x = -1.5$



Half way between!
 $\frac{-2 + 1}{2} = -0.5$
 $-2 + 1.5 = -0.5$

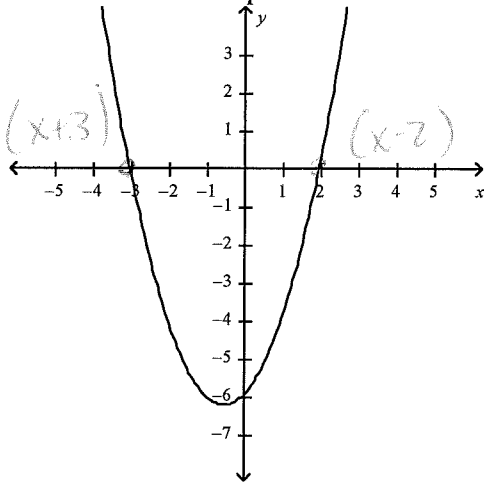
23. Solve $x^2 - x - 6 = 0$ by graphing the corresponding function and determining the zeros.

- a. $x = 3, x = 2$
 b. $x = -3, x = -2$
 c. $x = 2, x = -3$
 d. $x = 3, x = -2$



$(x + 2)(x - 3)$

24. What is the correct quadratic function for this parabola?



- a. $f(x) = (x-2)(x-3)$
- b. $f(x) = (x+2)(x-3)$
- c. $f(x) = (x-2)(x+3)$
- d. $f(x) = (x+2)(x+3)$

25. Which set of data is correct for the quadratic relation $f(x) = -3(x+2)(x-3)$?

	x-intercepts	y-intercept	Axis of Symmetry	Vertex
A.	(2, 0), (3, 0) ✗	$y = -18$ ✗	$x = 2.5$ ✗	(2.5, 6.75)
B.	(-2, 0), (3, 0) ✓	$y = -18$ ✗	$x = -0.5$ ✗	(-0.5, 15.75)
C.	(2, 0), (-3, 0) ✗	$y = 18$ ✓	$x = -0.5$ ✗	(-0.5, 15.75)
D.	(-2, 0), (3, 0) ✓	$y = 18$ ✓	$x = 0.5$ ✓	(0.5, 18.75)

- a. Set A.
- b. Set B.
- c. Set C.
- d. Set D.

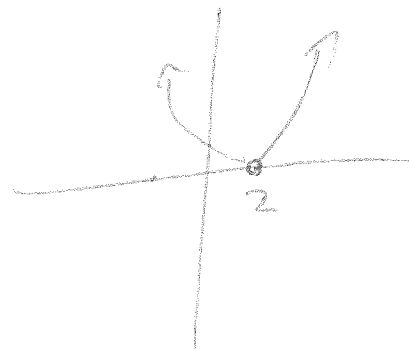
$3 \times 2 \times -3 = 18$

1/2 way between
-2 and 3
is 0.5

26. Which relation is the factored form of $f(x) = x^2 - 4x + 4$?

- a. $f(x) = (x-2)(x+2)$
- b. $f(x) = 4(x-1)^2$
- c. $f(x) = (x+4)(x-1)$
- d. $f(x) = (x-2)^2$

$y = (x-2)(x-2)$
 $y = (x-2)^2$



27. Which set of data is correct for the quadratic relation $f(x) = -2(x - 12)^2 + 15$?

	Direction parabola opens	Vertex	Axis of Symmetry $x=p$
A.	downward ✓	(15, -12) ✗	$x = 15$ ✗
B.	downward <i>negative</i> ✓	(12, 15) ✓	$x = 12$ ✓
C.	upward ✗	(-12, 15) ✗	$x = -12$ ✗
D.	upward ✗	(15, 12) ✗	$x = 15$ ✗

- a. Set A.
 b. Set B.
 c. Set C.
 d. Set D.

$$y = a(x-p)^2 + q$$

vertex = $(p, q) = (12, 15)$

28. Solve $3x^2 + 4x = 10 + x^2$ using the quadratic formula.

- a. $x = -\frac{1 + \sqrt{6}}{4}, x = -\frac{1 - \sqrt{6}}{4}$
 b. $x = \frac{1 + \sqrt{6}}{4}, x = \frac{1 - \sqrt{6}}{4}$
 c. $x = -1 + \sqrt{6}, x = -1 - \sqrt{6}$
 d. $x = 1 + \sqrt{6}, x = 1 - \sqrt{6}$

3,449 -1,449
 check with graph

$$2x^2 + 4x - 10 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-4 \pm \sqrt{4^2 - 4(2)(-10)}}{2(2)}$$

$$x = \frac{-4 \pm \sqrt{96}}{4} = \frac{-4 \pm 4\sqrt{6}}{4}$$

29. Which conjecture, if any, could you make about the sum of three odd integers?

- a. The sum will be an even integer.
 b. The sum will be an odd integer.
 c. The sum will be negative.
 d. It is not possible to make a conjecture.

$$3 + 5 + 7 = 15$$

$$1 + 7 + 9 = 17$$

$$-3 + 1 + 5 = 3$$

$$= 1 \pm \sqrt{6}$$

OR $(2n+1)(2m+1)(2p+1)$
 $= 4nmt \dots + 1$

30. Bob made the following conjecture:

The difference between two numbers always lies between the two numbers.

Is the following equation a counterexample to this conjecture? Explain.

$$6 - (-2) = 8$$

- a. Yes, it is a counterexample, because 8 lies between -2 and 6.
 b. No, it is not a counterexample, because 8 lies between -2 and 6.
 c. No, it is not a counterexample, because 8 is greater than -2 and 6.
 d. Yes, it is a counterexample, because 8 is greater than -2 and 6.

$$5 - 3 = 2 \text{ no}$$

$$5 - 2 = 3 \text{ yes}$$

8 is not between -2 and 6

31. Which of the following choices, if any, uses deductive reasoning to show that the sum of two odd integers is even?

$$\begin{aligned} &(2n+1) + (2m+1) \\ &= 2n + 2m + 2 \\ &= 2(n+m+1) \end{aligned}$$

- a. $3 + 5 = 8$ and $7 + 5 = 12$
- b. $(2x + 1) + (2y + 1) = 2(x + y + 1)$
- c. $2x + 2y + 1 = 2(x + y) + 1$
- d. None of the above choices

32. Alison created a number trick in which she always ended with the original number. When Alison tried to prove her trick, however, it did not work. What type of error occurs in the proof?

n	Use n to represent any number.
$n + 4$	Add 4.
$2n + 4$	Multiply by 2.
$2n + 8$	Add 4.
$n + 4$	Divide by 2.
$n - 1$	Subtract 5.

- a. a false assumption or generalization
- b. division by zero
- c. an error in calculation
- d. There is no error in the proof.

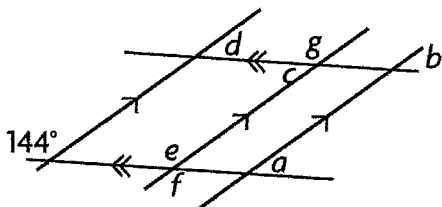
33. Determine the unknown term in this pattern.

8, 17, 14, 23, _____, 29, 26, 35

$$+9 \quad -3 \quad +9 \quad -3 \quad +9 \quad -3 \quad +9$$

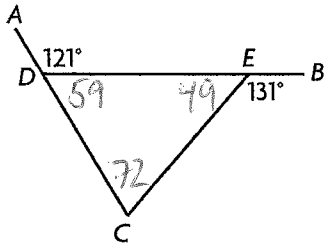
- a. 21
- b. 22
- c. 20
- d. 25

34. Which statement about the angles in this diagram is false?



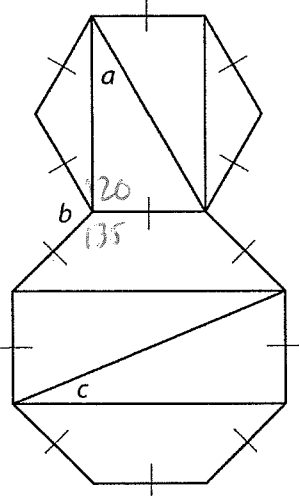
- a. $\angle e = \angle f$ ✓ vert. opp.
- b. $\angle a = \angle b$ ✓ corresp.
- c. $\angle d = \angle c$ ✓ alt. int.
- d. $\angle f = \angle a$ X not even close!

35. Which are the correct measures of the interior angles of $\triangle CDE$?



- a. $\angle DCE = 92^\circ$, $\angle CDE = 49^\circ$, and $\angle CED = 39^\circ$
- b. $\angle DCE = 52^\circ$, $\angle CDE = 69^\circ$, and $\angle CED = 59^\circ$
- c. $\angle DCE = 62^\circ$, $\angle CDE = 49^\circ$, and $\angle CED = 69^\circ$
- d. $\angle DCE = 72^\circ$, $\angle CDE = 59^\circ$, and $\angle CED = 49^\circ$

36. Determine the value of b .



$$\frac{180(6-2)}{6} = 120$$

$$\frac{180(8-2)}{8} = 135$$

- a. 144°
- b. 154°
- c. 126°
- d. 105°

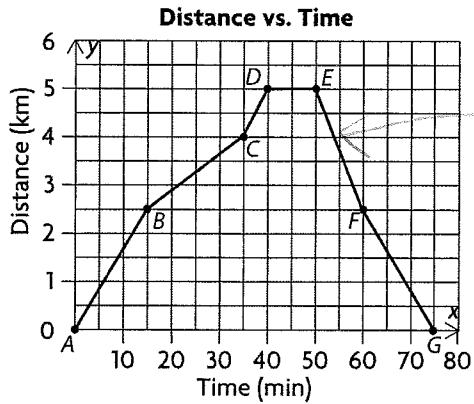
$$360 - 120 - 135$$

37. Maureen ran 15 km in 1.25 h. What is her running speed?

- a. 12 km/h
- b. 15 km/h
- c. 120 m/min
- d. 200 m/s

$$\frac{15 \text{ km}}{1.25 \text{ h}} = \frac{12 \text{ km}}{\text{h}}$$

38. The graph shows how a cyclist travels over time.
Over which interval is the cyclist travelling the fastest?



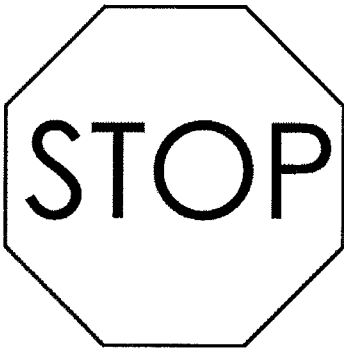
steepest part of graph = highest speed!

- a. AB
- b. BC
- c. EF
- d. FG

39. Which situations could be described using the rates \$15.56/lb, 80 km/h, and \$1.58/L?

- a. price of nails, average human running speed, price of sunflower oil
- b. price of coffee, cruising speed of an airplane, price of milk
- c. price of lobster, highway speed limit, price of apple juice
- d. price of crude oil, average speed of a truck, price of cola

40. Stop signs have a standard width of 60 cm. Determine which scale factor was used to draw it.



4.5 cm

- a. $13\frac{1}{3}$
- b. 8.3%
- c. $\frac{1}{6}$
- d. 7.5%

$$4.5 \div 60 = 0.075$$

OR

$$7.5\%$$

41. A 1:25 scale model of a garbage truck is 0.5 ft tall, 0.32 ft wide, and 1.4 ft long. What are the dimensions of the actual garbage truck?

- a. 25 ft by 12.5 ft by 50 ft
- b. 9 ft by 6.4 ft by 25 ft
- c. 15 ft by 7.4 ft by 33.5 ft
- d. 12.5 ft by 8 ft by 35 ft

$\begin{array}{r} 0.5 \\ \times 25 \\ \hline 12.5 \end{array}$	$\begin{array}{r} 0.32 \\ \times 25 \\ \hline 8 \end{array}$	$\begin{array}{r} 1.4 \\ \times 25 \\ \hline 35 \end{array}$
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42. Rectangle A is 6 cm high, 9 cm long, and 15 cm wide.
Rectangle B is 14 cm high, 21 cm long, and 35 cm wide.
By what factor is the volume of rectangle B greater than the volume of rectangle A?

- a. $\frac{441}{7}$
- b. $\frac{7}{9}$
- c. $\frac{343}{27}$
- d. $\frac{49}{81}$

NEW : ORIGINAL

$$\frac{14}{6} = \frac{7}{3}$$

$$\text{Volume} = \frac{7}{3} \times \frac{7}{3} \times \frac{7}{3} = \frac{343}{27}$$

