Montana Comprehensive Assessment System (MontCAS, Phase 2)

Criterion-Referenced Test (CRT)

COMMON CONSTRUCTED-RESPONSE ITEM RELEASE
MATHEMATICS, GRADE 10

OPI

OFFICE OF PUBLIC INSTRUCTION

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Mathematics
Session 1 (Calculator)

You may use a calculator during this session.

25. The students in Mr. Taylor's class are studying quadrilaterals.

    a. Kendrell states that all rectangles are similar.
    - If this statement is true, explain why it is true.
    - If this statement is not true, sketch two rectangles that serve as a counterexample. Explain why the rectangles you drew prove that Kendrell's statement is not true.

    b. Christina states that all squares are similar.
    - If this statement is true, explain why it is true.
    - If this statement is not true, sketch two squares that serve as a counterexample. Explain why the squares you drew prove that Christina's statement is not true.

    BE SURE TO LABEL YOUR RESPONSES (a) AND (b).

Scoring Guide

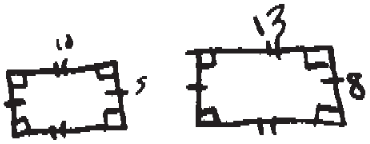
Score	Description
4	Student gives counterexample in part a, illustrating that all rectangles are not similar (must clearly show and state that corresponding sides are not proportional) AND justification in part b that, for any two squares, the lengths of corresponding sides are proportional and the corresponding angles are congruent.
3	Student gives counterexample in part a, illustrating that all rectangles are not similar AND justification in part b that any two squares are similar; illustration OR justification may be incomplete (e.g., rectangles clearly show non-proportionality but explanation does not address the issue) or contains minor error.
2	Student gives counterexample in part a, illustrating that all rectangles are not similar (must clearly show and state that corresponding sides are not proportional) OR justification in part b that, for any two squares, the lengths of corresponding sides are proportional and the corresponding angles are congruent. **OR** Student makes correct arguments for both parts but justifications for both are incomplete.
1	Student demonstrates minimal understanding of similarity and/or properties of rectangles and/or squares.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Score Point 4

Sample 1

25.

a. False



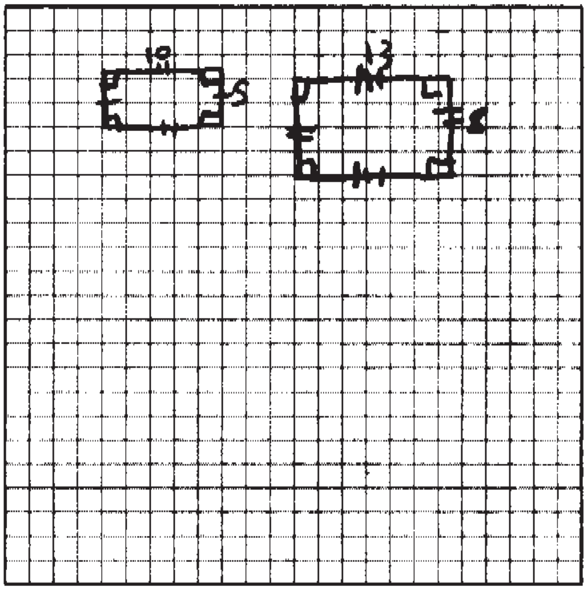
$$\frac{10}{5} \neq \frac{13}{8}$$

not all rectangles are similar

b. true,

$$\frac{2}{2} = \frac{5}{5}$$

In order to be a square all sides and $\angle$s must be $\cong$. Both pair of sides are parallel

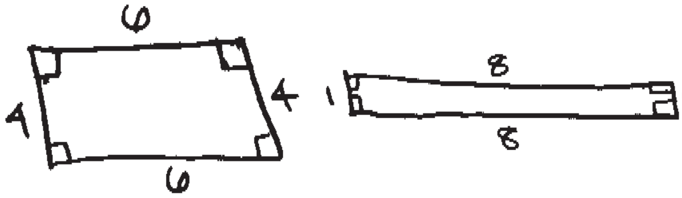


Score Point 4

Sample 2

25.

a.



These rectangles are not similar because the measurements are not proportional, even though the angles are the same.

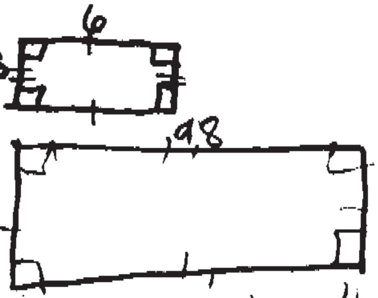
b. Yes, this is true because all squares must have four 90° angles and sides of equal length. Therefor, any two squares will have the same angle measures and proportional side measures, making them similar.

Score Point 3

Sample 1

25.

A-False



They are not proportionally acurate to eachother.

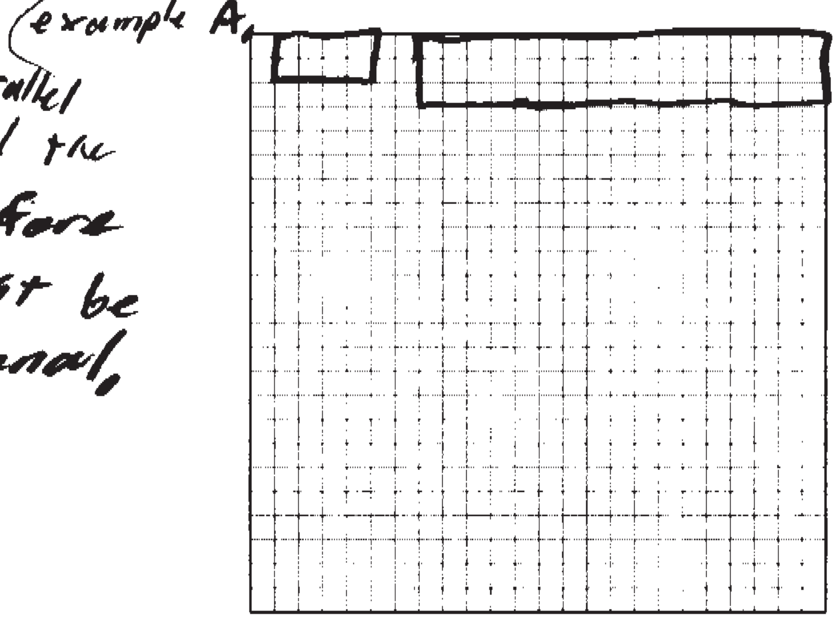
B True - Squares all have the same proportions one is All side lengths are equal. In all equal lengths 2 squares will always be proportionally correct because all sides are equal.

Score Point 3

Sample 2

25. A. Kendrell's statement is wrong, all rectangles are not similar. They all have 2 pairs of parrallel sides, but the two pairs of sides do not have to be directly proportional.

B. Christina is right, all squares have 2 pairs of parrallel sides that are all the same length, therefore all squares must be directly proportional.



Score Point 2

Sample 1

25. (a) This statement is not true because rectangles do not always have to be congruent.

These are both rectangles but they are not similar.

(b) This statement is true because all four of square's sides are equal in length. so therefor they are similar.

Score Point 2

Sample 2

25. a)

b) true, all squares have sides of the same lenght and all the sides meet at 90° angles, some squares may be different sides but all sides are the same length.

Score Point 1

Sample 1

25.

-270
2 200
2500

a. Yes, it is true because rectangles have 90° angles

b. Yes, it is true because squares have sides equal lengths and 90° angles.

Score Point 1

Sample 2

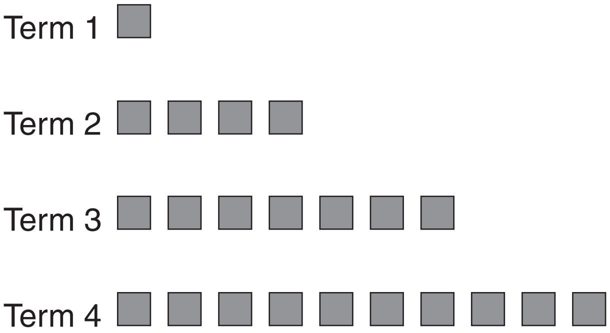
25 ⓐ They have only 2 pairs of sides and the sides opposite eachother are the same length,. All angles are 90°.

ⓑ They have four sides that are equal length and all angles are 90°.

Mathematics
Session 3 (No Calculator)

You may NOT use a calculator during this session.

73. The picture below shows the first four terms in a sequence.



a. How many blocks are in Term 12 of the sequence?

b. Let *a* represent the number of blocks in Term *n*. Write an expression that shows how to find the number of blocks in the term **after** Term *n*.

c. Let *b* represent the number of blocks in a term and let *n* represent the term number. Write an equation to show the relationship between *b* and *n*.

Scoring Guide

Score	Description
4	4 points
3	3 points
2	2 points
1	1 point **OR** Minimal understanding of patterns or algebraic representations.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Training Notes

Part a: (1 point)

- 1 point for the correct number of blocks (34)

Part b: (1 point)

- 1 point for the correct recursive formula (e.g., next term is $a + 3$, $y = a + 3$)

Part c: (2 points)

- 2 points for the correct equation ($b = 3n - 2$, or equivalent)
  OR
- 1 point for the correct constant term, coefficient, or expression

Score Point 4

Sample 1

73.

A. 24 + 10 = 34' Blocks

B. Numberber, of Blocks = previous Term + 3.

$N = A + 3$

C. $B = N \cdot 2 + (N - 2)$

Score Point 4

Sample 2

73.

ⓐ 34 blocks

ⓑ $a+3$

ⓒ $b=3(n-1)+1$

Score Point 3

Sample 1

73. a.) 10+3 =	5	6	7	8	9	10	11	12
	13	16	19	22	25	28	31	34

12th term = $\boxed{34}$

b.) a = # of blocks in Term n

3+a = Term n

c.) $\boxed{b = 3n}$

Score Point 3

Sample 2

73. a. 34 blocks

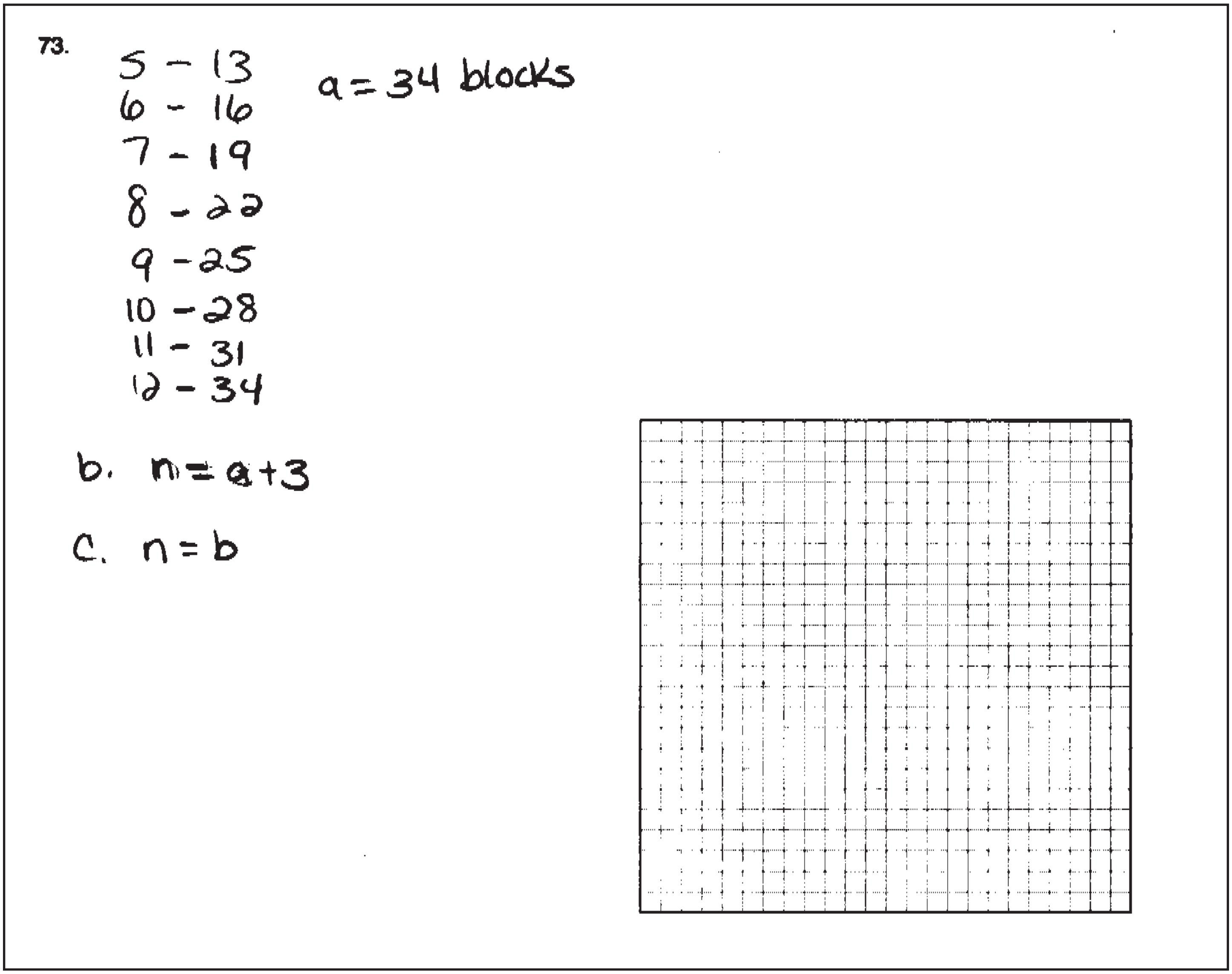
b. Term $n+3=a$

c. $3n-2=b$

1 - 1
2 - 4
3 - 7
4 - 10
5 - 13
6 - 16
7 - 19
8 - 22
9 - 25
10 - 28
11 - 31
12 - 34

Score Point 2

Sample 1



73.

5 - 13
6 - 16
7 - 19
8 - 22
9 - 25
10 - 28
11 - 31
12 - 34

a = 34 blocks

b. n = a + 3

c. n = b

Score Point 2

Sample 2

73. A. 34 blocks

B. $n=a+3$

C. $n=b$

Score Point 1

Sample 1

73.

a. 31 blocks

B. $n = 3 + a$

C. ?

Score Point 1

Sample 2

73.

A) 3n

B) n+3n

C.) n+3n