

Ministry Exam Simulation

First name: _____

Last name: _____

Group: _____

Result: _____ /56



Mathematics CST Secondary 4

In this exam simulation, there are 2 multiple-choice questions, 2 short-answer questions, and 4 situations involving applications.

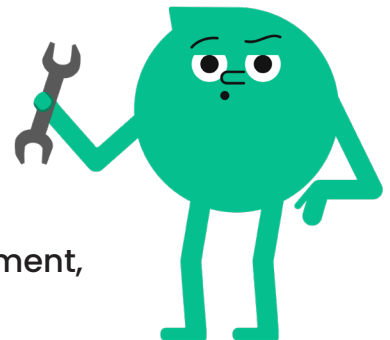
Try doing this practice as if you were taking an exam. In other words, use only the permitted materials and try to stay within the maximum time limit.

Permitted Materials

- Scientific calculator
- Graph paper (draft sheets)
- Handwritten, double-sided memory aid

Maximum duration: 100 minutes

The figures in this exam simulation, as in the Ministry assessment, are not to scale.



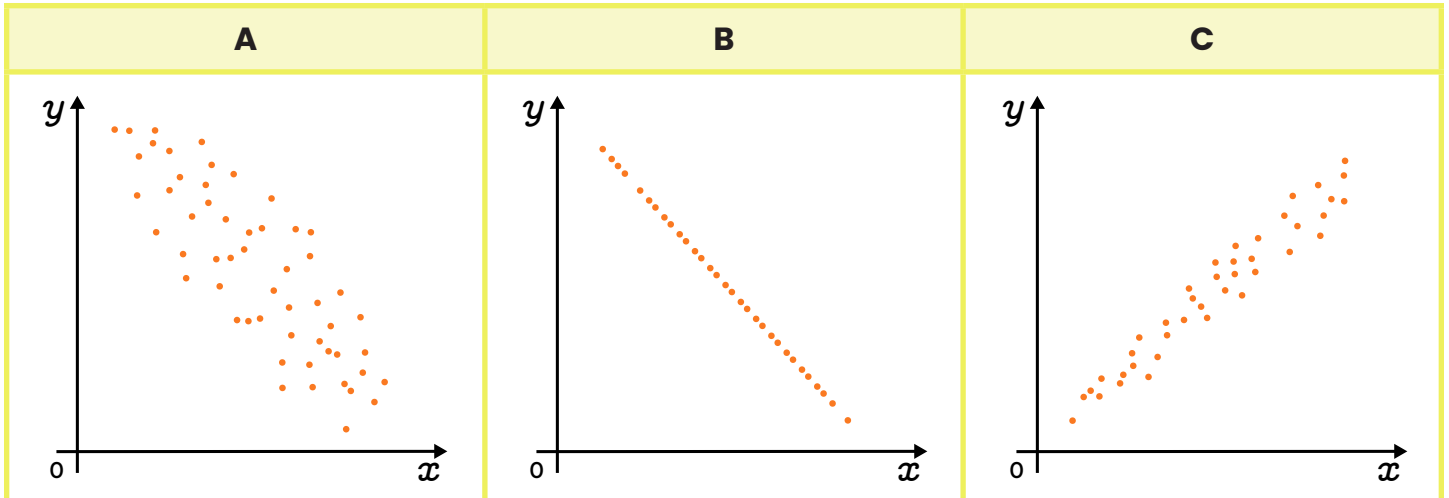
Student Booklet

Section A: Multiple-Choice Questions

In this section, fill in the circle corresponding to the correct answer. You must choose only one answer. Each correct answer is worth 4 points. A wrong answer or no answer is worth 0 points. Your work is not considered for the questions in this section.

Question 1

Place the following scatter plots in descending order of linear correlation coefficient.



- a) $B > C > A$
- b) $A < C < B$
- c) $C > A > B$
- d) $B < A < C$

Answer: (a) (b) (c) (d)

Score

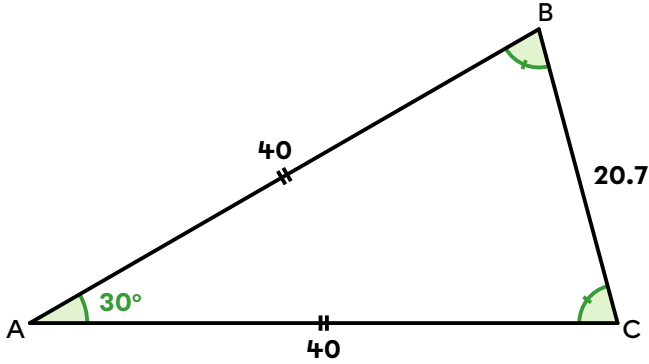
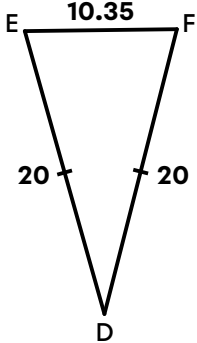
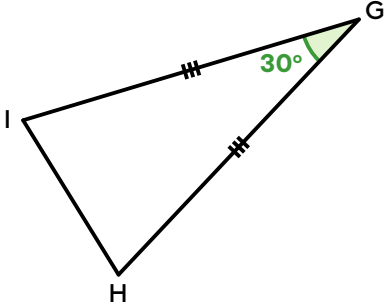
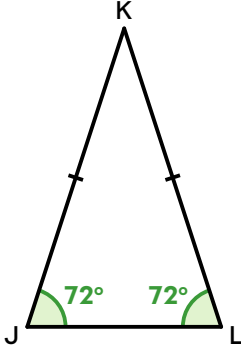
4

0

Question 2

Which of these doesn't belong?

All but one of the following triangles are similar. Which one?

A	B
	
C	D
	

Answer: (a) (b) (c) (d)

Score

4

0

Section B: Short-Answer Questions

In this section, enter your answer(s) on the line provided. Each correct answer is worth 4 points. A wrong answer or no answer is worth 0 points. Your work is not considered for the questions in this section.

Question 3

Consider a parabola passing through the point $(8, 48)$. What is the x-coordinate, in fractional notation, of the point or points on the parabola whose y-coordinate is $\frac{4}{27}$?

Answer: The point or points with the y-coordinate $\frac{4}{27}$
have the x-coordinate _____.

Score

4

0

Question 4

Last year, Marie set up a new business for her Latin dance studio. Her business is doing well, and she wants to grow her customer base. She decides to conduct a statistical study of her current customers to better target potential customers with her advertising campaign. For this purpose, she compiles the ages of her dancers in the following stem-and-leaf plot.

Women		Men
9-5	2	
8-7-6-6-4-1	3	5-9
8-5-4-2	4	3-3-7-8
3-1	5	1-2-2-4

Help Marie calculate the mean age of the women, the mean age of the men, and the mean deviation for all of the dancers. Round your answers to the nearest tenth.

Answer:

- The mean age of the women is _____ years.
- The mean age of the men is _____ years.
- The mean deviation for the ages of the men and the women is _____ years.

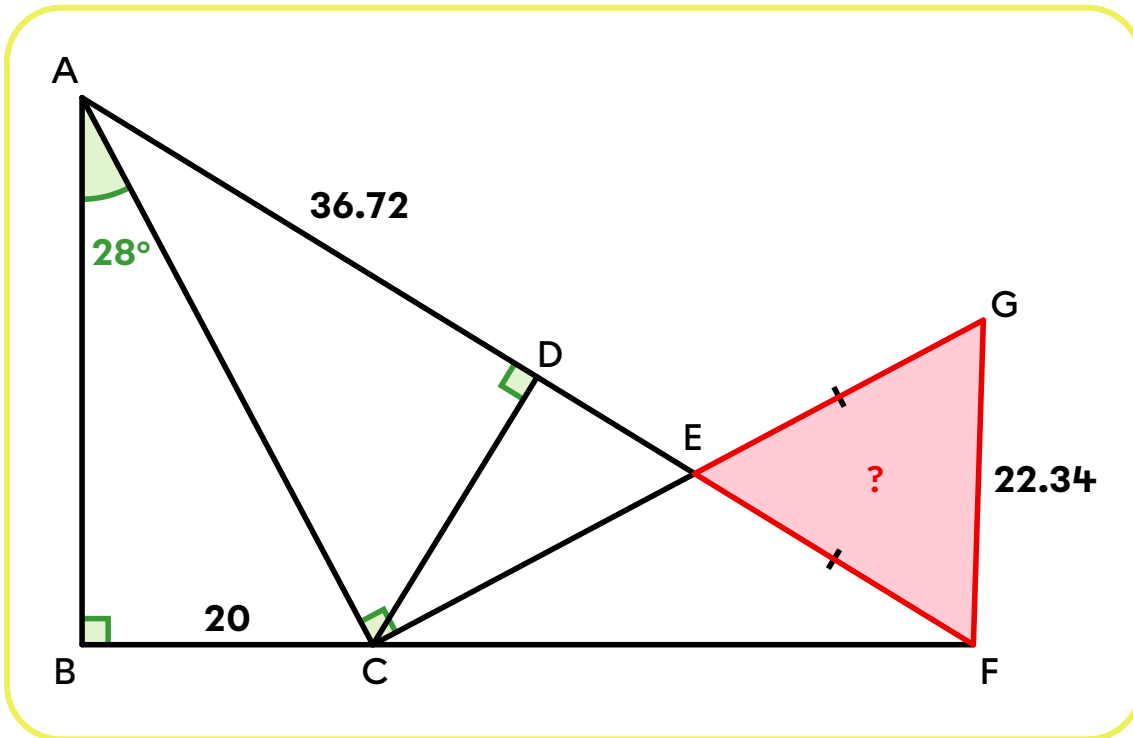
Score				
4	3	2	1	0

Section C : Situations Involving Applications

In this section, you must show every step of your work. Each question is worth 10 points and is marked using an assessment grid available in the appendix.

Question 5

What is the area of triangle GEF?



Answer: Triangle GEF has an area of approximately _____ square units.

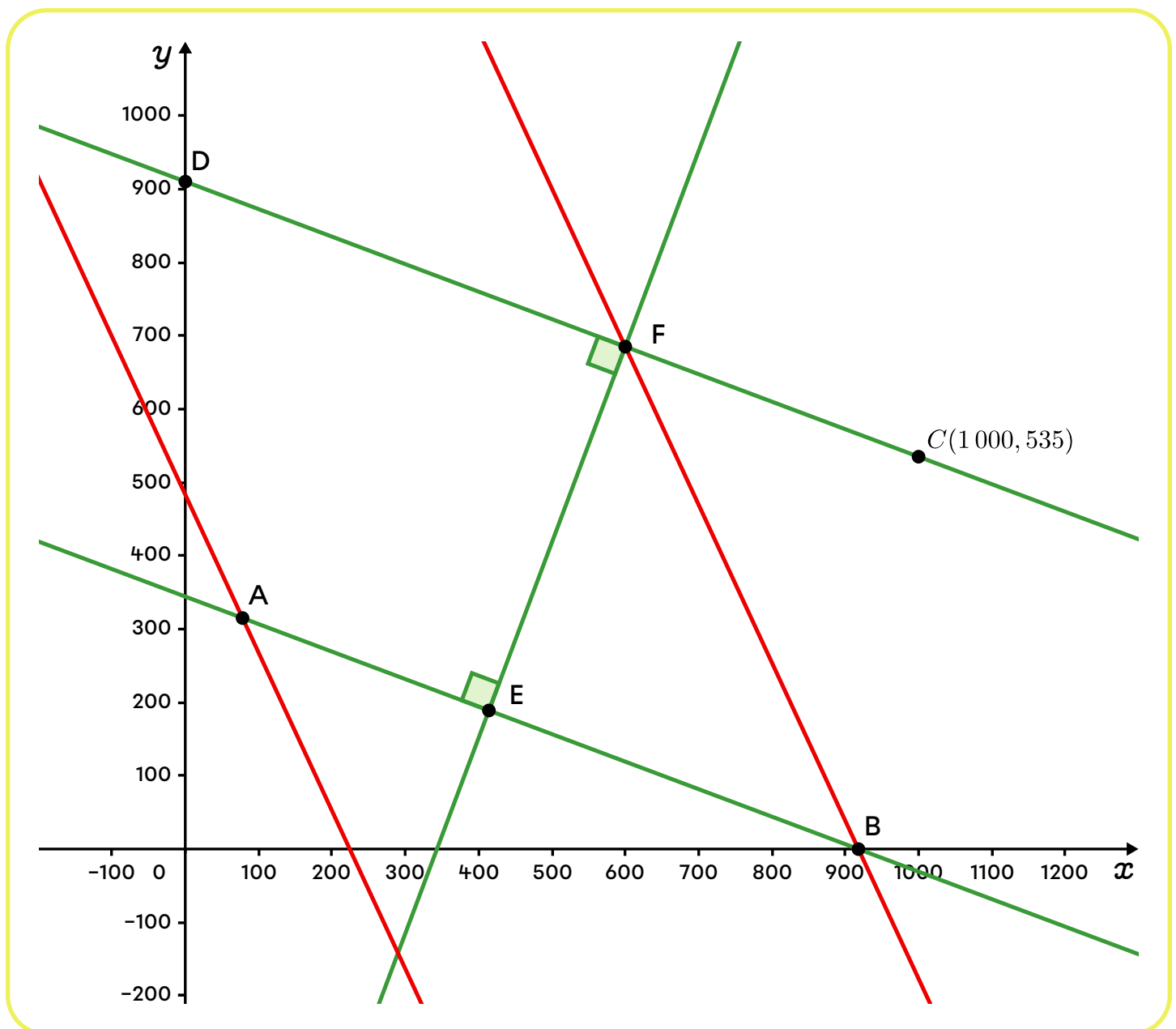
Question 6

A map of city streets has been drawn on a Cartesian plane. Measurements are in metres. Red streets are limited to 30 km/h. Green streets are limited to 50 km/h. What is the fastest route from point B to point D?

- Point B is on the x-axis.
- Point D is on the y-axis.
- The x-coordinate of point A is 78.
- The rule for street AB is $y = -\frac{3}{8}x + 344.25$.
- Point E divides segment $\overline{BA}$ at a ratio of 3 to 2.

- Assume that there is no acceleration or deceleration.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$



Answer: The fastest route from point B to point D is _____ ,
because _____ .

Question 7

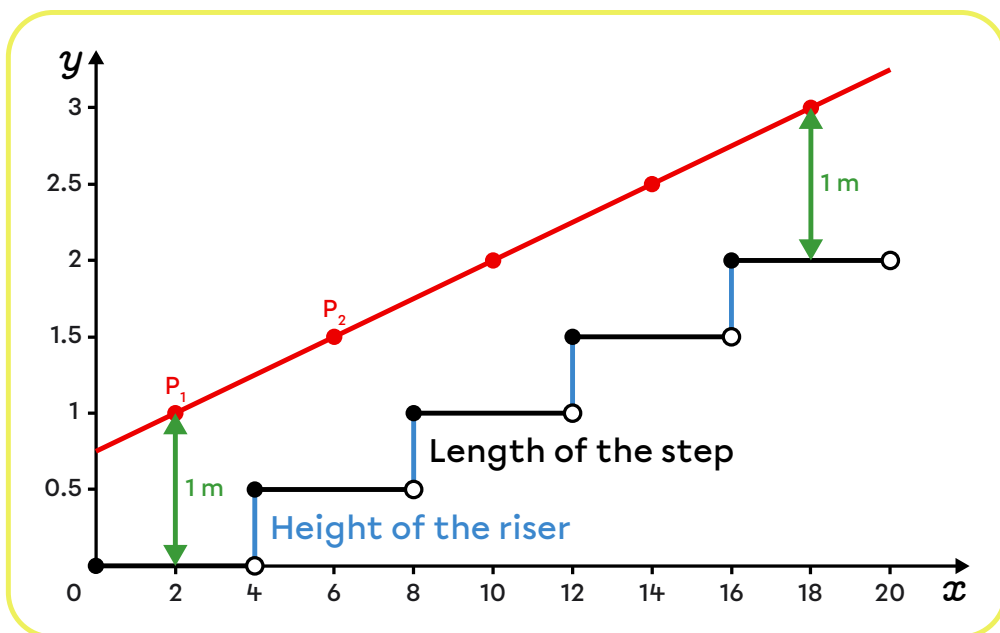
An industrial designer creates highly stylized, out-of-the-ordinary metal staircases. All the steps are equal in length and equal in height.

For safety, he needs to add a handrail. This handrail is represented by the linear function $f(x) = ax + b$ which must pass through **the points located 1 m above the midpoint of each step.**

Here, for example, is a profile view of a 5-step staircase with the handrail in red.

Formulate a conjecture that relates the handrail slope (a) to the step dimensions.

If you need a hint, take a look at the answer key.



Answer: _____

Question 8

A trucking company owns 2 fleets of trucks: MetaCargo and NovaFret. It analyzes its trucks' fuel consumption.

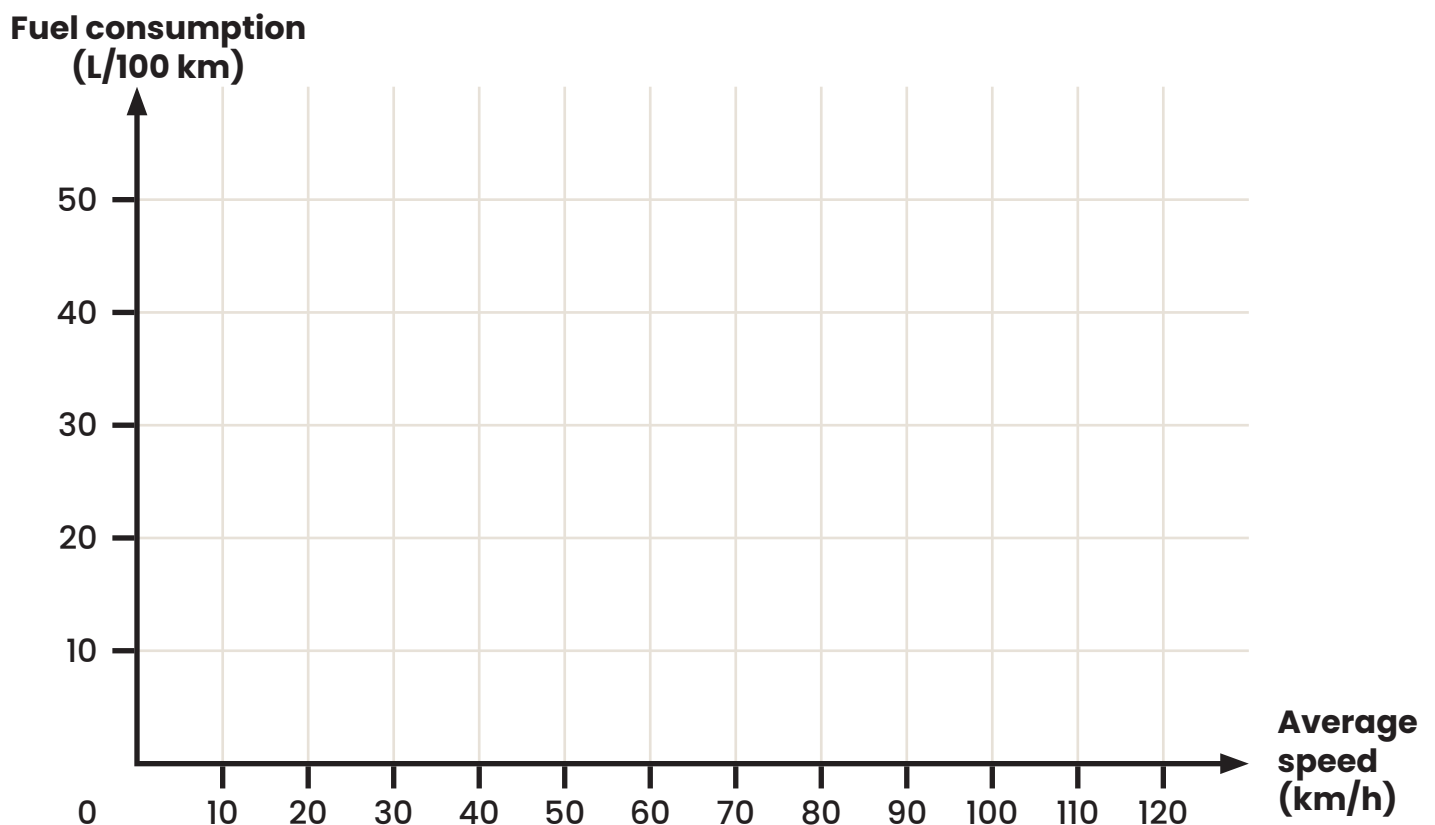
- For trucks in the MetaCargo fleet, it compiled the following data on 8 routes, noting average speed (in km/h) and fuel consumption (in L/100 km).

x: Average speed (km/h)	70	75	80	85	90	95	100	110
y: Fuel consumption (L/100 km)	28.2	29.1	31.4	30.5	32.3	34.6	35.0	37.7

- For its NovaFret fleet, the truck manufacturer's data show that fuel consumption tends to increase according to an exponential model of the form $y = a(c)^x$.

A stationary truck with its engine running consumes fuel at a rate equivalent to 13.8 L/100 km, and fuel consumption increases more and more rapidly as speed increases. According to the manufacturer's data, it increases by 1% for every 1 km/h increase in average speed.

For the Montreal–Quebec City route, the average speed of the trucks is 105 km/h. Help the president of the transport company decide which fleet of trucks he should use.



Answer: Given that the average route speed is 105 km/h, he should use trucks
in the _____ fleet.

Justification: _____
