

# Ministry Exam Simulation

First name: \_\_\_\_\_

Last name: \_\_\_\_\_

Group: \_\_\_\_\_

Result: \_\_\_\_\_ /56



## Mathematics SN Secondary 4

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

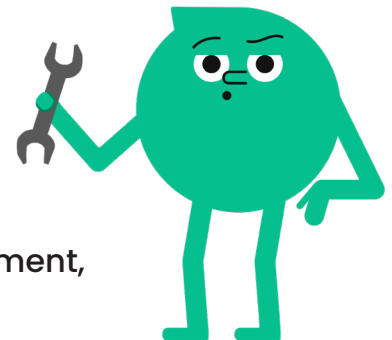
Try doing this practice as if you were taking an exam. In other words, use only the permitted materials and try to stay within the maximum time limit.

### 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.



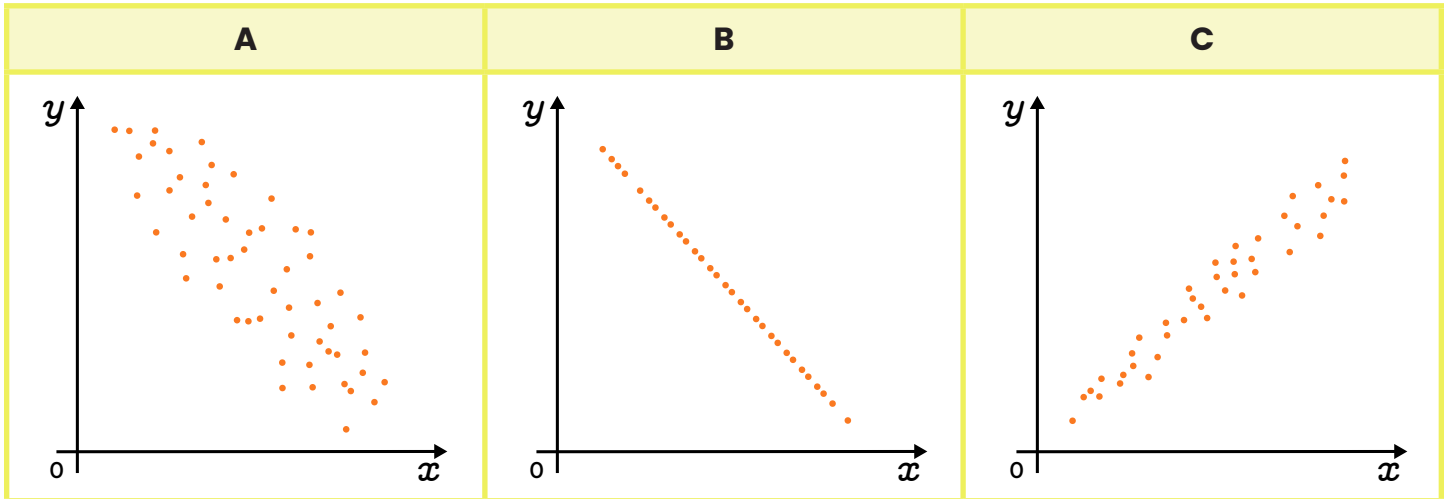
## Student Booklet

## 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)  $B < A < C$

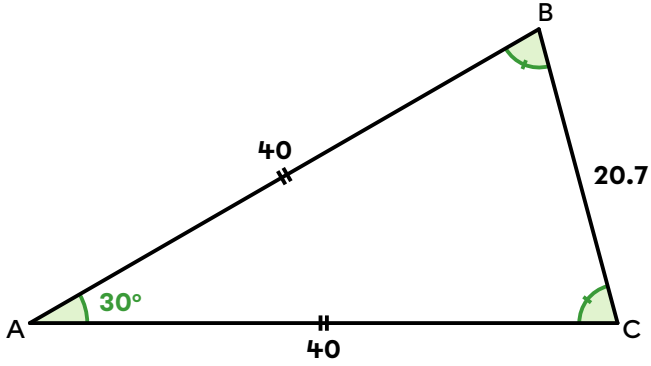
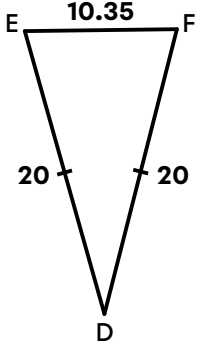
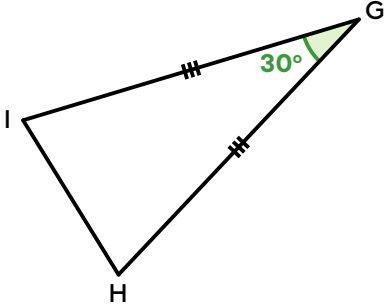
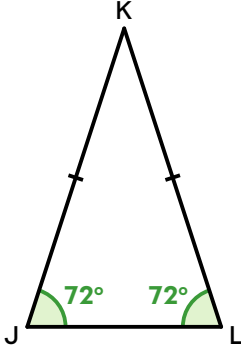
Answer: (a) (b) (c) (d)

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

Find the coordinates of the vertex of a parabola that passes through points (1,8), (2,-2) and (7,8).

**Answer:** The vertex coordinates are ( \_\_\_\_\_ , \_\_\_\_\_ ).

Score	
4	0

### Question 4

The area of a quadrilateral is represented by the following algebraic expression.

$$25x^2 - 35x + 12$$

Identify the type of quadrilateral and the algebraic expressions corresponding to the lengths of its sides.

**Answer:** The sides of this \_\_\_\_\_ are represented by the expressions \_\_\_\_\_ and \_\_\_\_\_ .

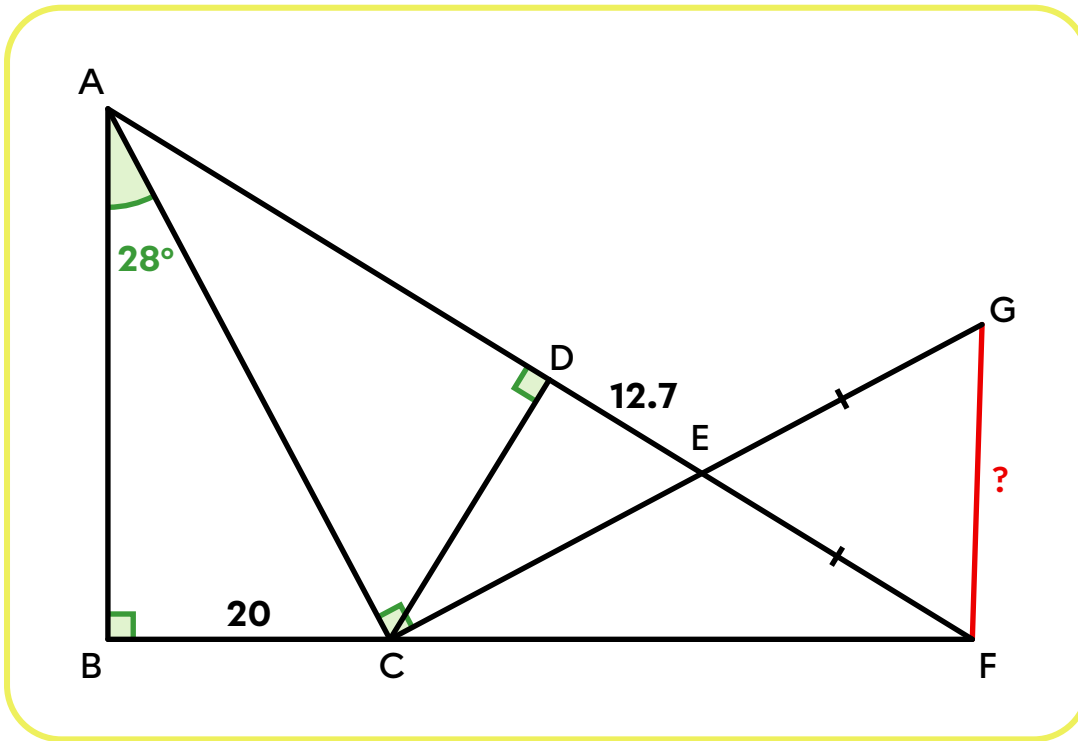
Score		
4	2	0

## 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 length of segment  $\overline{FG}$ ?



**Answer:** Segment  $\overline{FG}$  measures approximately \_\_\_\_\_ units.

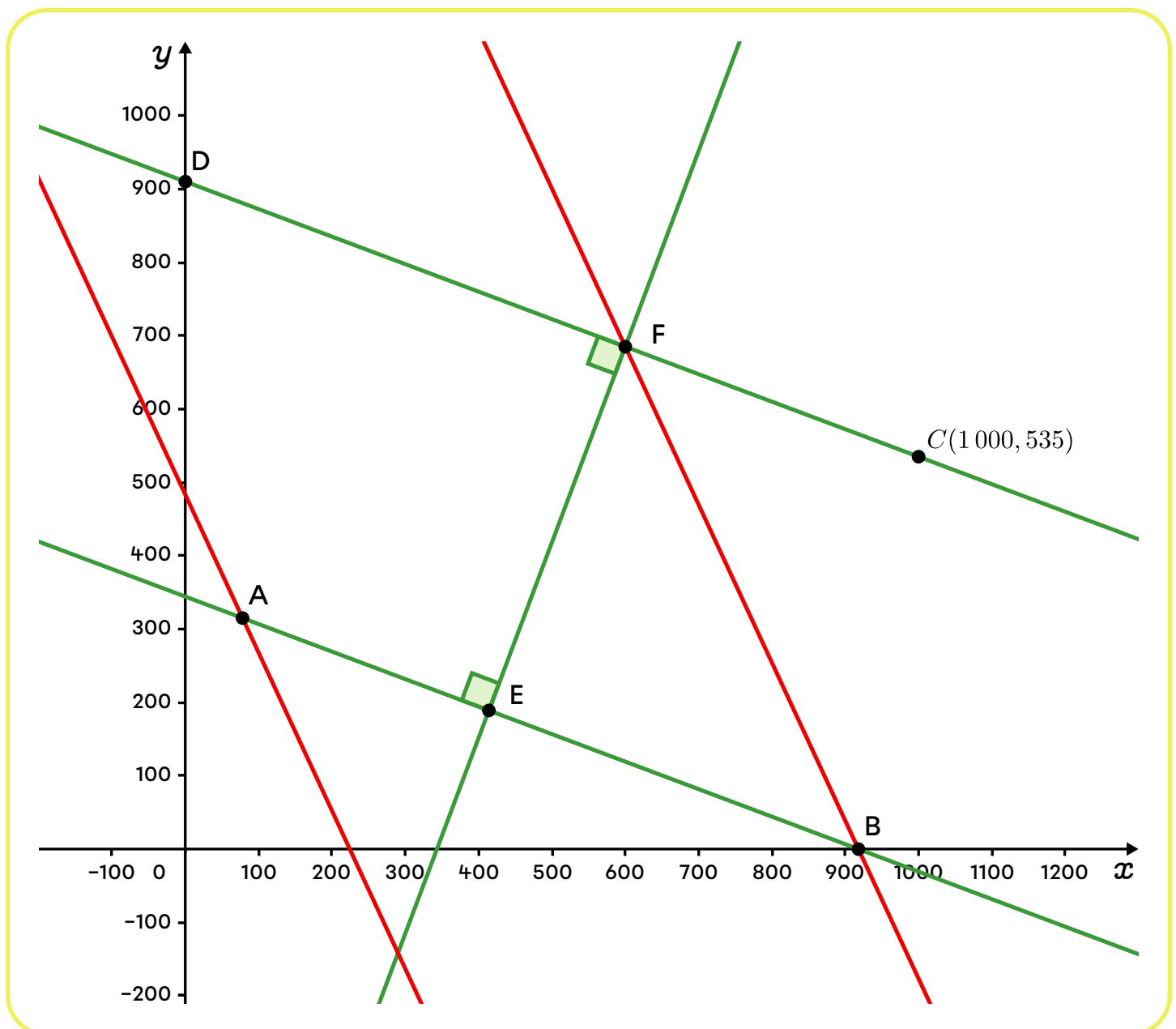
## Question 6

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  $3x + 8y = 2754$ .
- The y-coordinate for point E is equal to  $\frac{3}{5}$  of the y-coordinate for point A.

- 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

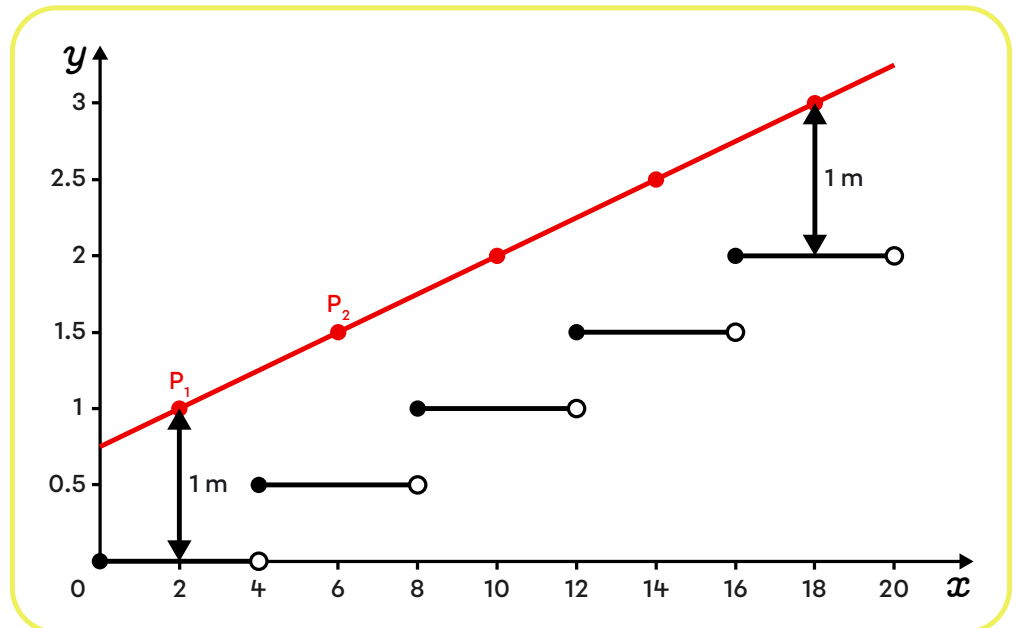
An industrial designer creates highly stylized, out-of-the-ordinary metal staircases. To model a staircase in profile on a Cartesian plane, he uses an integer function of the shape  $f(x) = a[bx]$ .

For safety, he needs to add a handrail. On the plane, this handrail is represented by the linear function  $g(x) = mx + k$ , 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** linking parameters  $a$  and  $b$  of function  $f(x)$  to parameters  $m$  and  $k$  of function  $g(x)$ .

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.

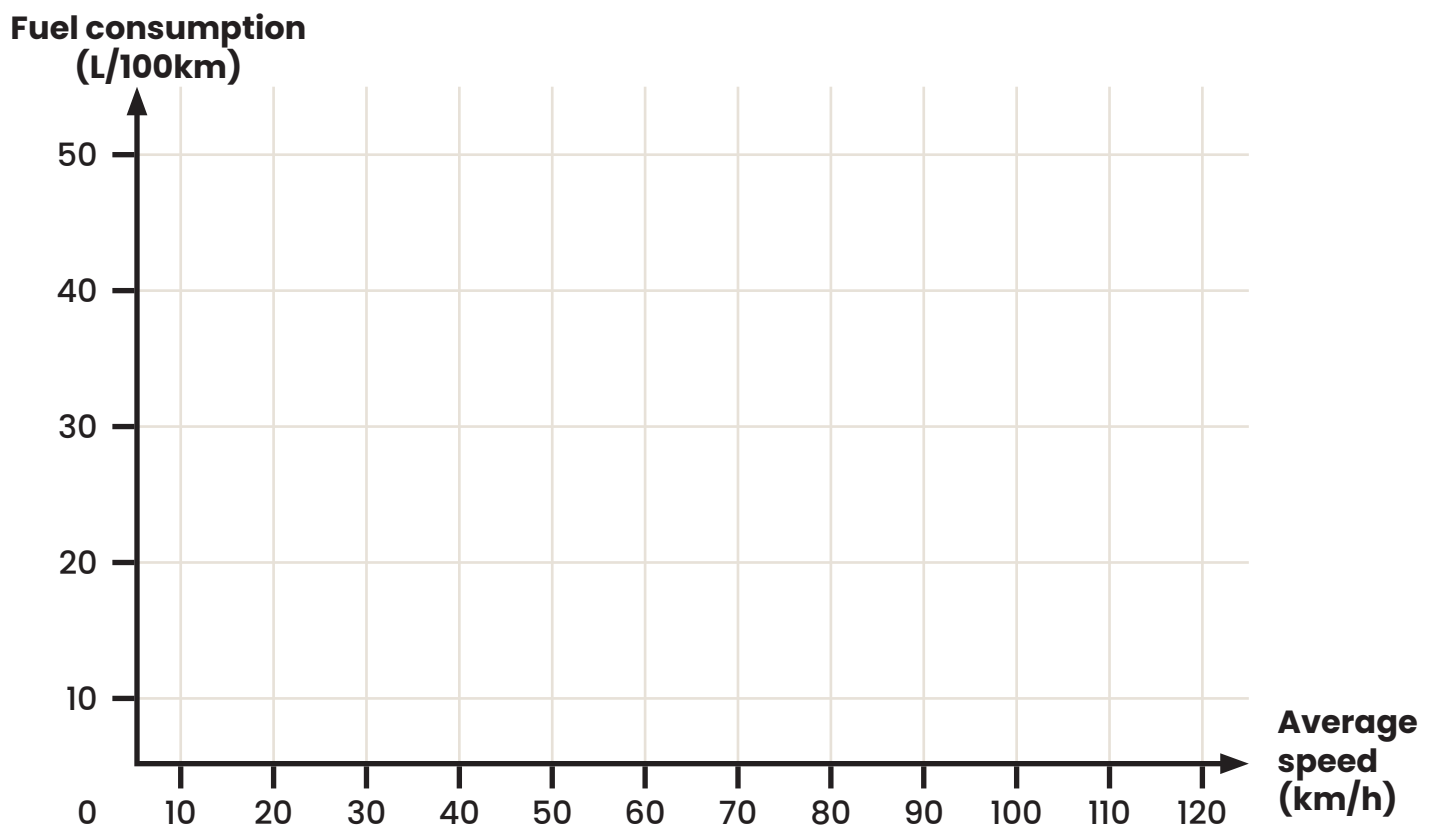
- For trucks in the MetaCargo fleet, it compiled the following data on 8 routes, noting average speed (in km/h) and fuel consumption (in L/100 km).

<b>x : Average speed (km/h)</b>	<b>70</b>	<b>75</b>	<b>80</b>	<b>85</b>	<b>90</b>	<b>95</b>	<b>100</b>	<b>110</b>
<b>y : Fuel consumption (L/100 km)</b>	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 a quadratic model of shape  $y = ax^2 + k$ .

A stationary truck with its engine running consumes fuel at a rate of 14.35 L/100 km. Second, fuel consumption increases more and more rapidly as speed increases. According to the manufacturer's data, a truck travelling at a speed of 75 km/h will consume fuel at a rate of 25.6 L/100 km.

Help the president of the transport company decide which fleet of trucks he should use based on the average speed travelled on various delivery routes.



**Answer:** Given that the average route speed is \_\_\_\_\_ ,  
he should use trucks in the \_\_\_\_\_ fleet.  
Otherwise, he should use the \_\_\_\_\_ fleet.