

Grade 9

Assessment of Mathematics, Applied Program

RELEASED
**SAMPLE ASSESSMENT
QUESTIONS**

WINTER 2007

Education Quality and
Accountability Office



Fabulous Fencing (Winter 2007)

B = Blank: nothing written or drawn in response to the question

I = • Illegible: cannot be read; completely crossed out/erased; not written in English

• Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, "?", "!", "I don't know")

• Off topic: no relationship of written work to the question

Codes	Description
10	Application of knowledge and skills of algebra to determine the dimensions of the garden shows limited effectiveness due to <ul style="list-style-type: none">• misunderstanding of concepts of algebra• incorrect selection or misuse of procedures
20	Application of knowledge and skills of algebra to determine the dimensions of the garden shows some effectiveness due to <ul style="list-style-type: none">• partial understanding of algebraic concepts• errors and/or omissions in the application of the procedures
30	Application of knowledge and skills of algebra to determine the dimensions of the garden shows considerable effectiveness due to <ul style="list-style-type: none">• an understanding of most of algebraic concepts• minor errors and/or omissions in the application of the procedures
40	Application of knowledge and skills of algebra to determine the dimensions of the garden shows a high degree of effectiveness due to <ul style="list-style-type: none">• a thorough understanding of algebraic concepts• an accurate application of the procedures (any minor errors and/or omissions do not detract from the demonstration of a thorough understanding) (e.g., determines dimensions to be 10 m and 40 m)

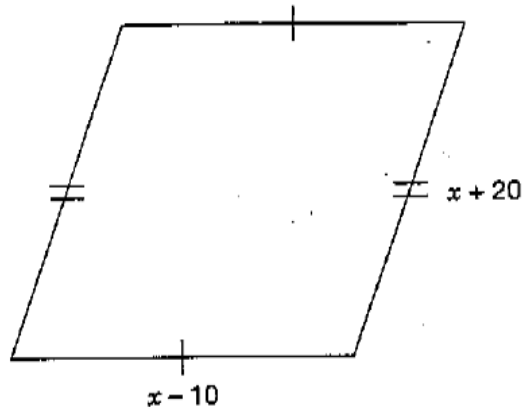
ANCHOR

Applied Winter 2007 Q5

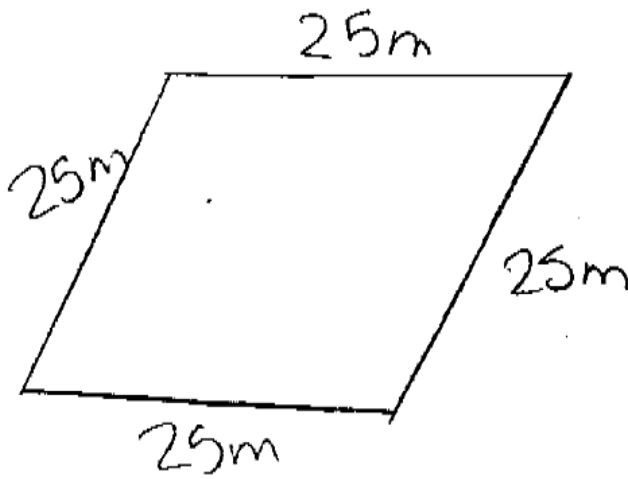
Name: Fabulous Fencing

CODE: 10

Pauline builds a fence around her garden, which is shaped like a parallelogram, as shown below.



Pauline uses 100 metres of fencing along the perimeter of the garden. Find the dimensions of her garden. Show your work.



$$100 \div 4 = 25$$

Rationale:

Student demonstrates a misunderstanding of the concepts; treats shape as a rhombus and divides perimeter by 4.

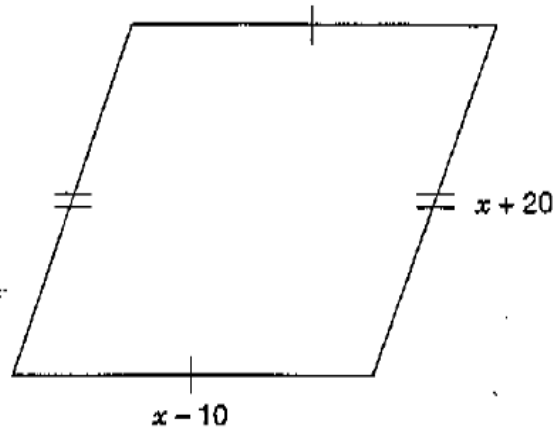
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Applied Winter 2007 Q5

Name: Fabulous Fencing

CODE: 20

Pauline builds a fence around her garden, which is shaped like a parallelogram, as shown below.



Pauline uses 100 metres of fencing along the perimeter of the garden. Find the dimensions of her garden. Show your work.

$$\begin{aligned}
 100 &= 2(x - 10) + 2(x + 20) \\
 &= 2x - 20 + 2x + 40 \\
 &= 2x + 2x - 20 + 40 \\
 &= 4x - 20
 \end{aligned}$$

Rationale:

Student demonstrates an omission in the application of the procedures to determine the dimensions of the garden; created a correct equation but does not determine value of x or solve for the dimensions.

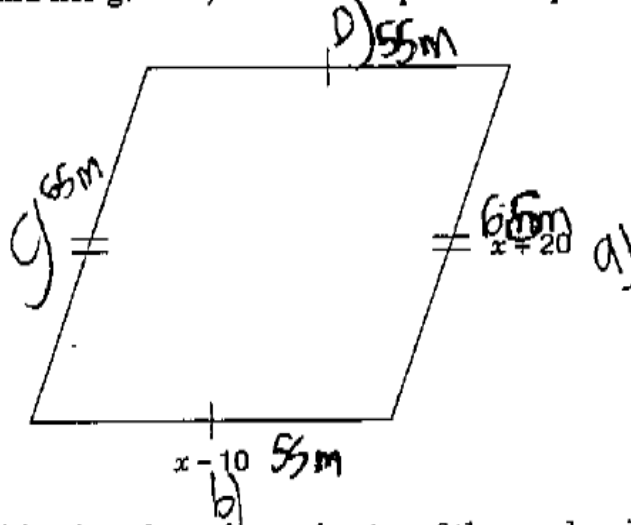
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Applied Winter 2007 Q5

Name: Fabulous Fencing

CODE: 30

Pauline builds a fence around her garden, which is shaped like a parallelogram, as shown below.



Pauline uses 100 metres of fencing along the perimeter of the garden. Find the dimensions of her garden. Show your work.

$$\begin{aligned}
 x+20+x-10 &= 100 \\
 x+x &= 100-20+10 \\
 2x &= 90 \\
 \frac{2x}{2} &= \frac{90}{2} \\
 x &= 45
 \end{aligned}$$

$$\begin{aligned}
 a) &= x+20 \\
 &= 45+20 \\
 &= 65\text{m} \\
 b) &= 65\text{m}
 \end{aligned}$$

$$\begin{aligned}
 b) &= x+10 \\
 &= 45+10 \\
 &= 55\text{m} \\
 d) &= 55\text{m}
 \end{aligned}$$

Rationale:

Student demonstrates a minor error in the application of the procedures to determine the dimensions of the garden (used only one length and one width in the equation); however, student solves the equation correctly and states dimensions with minor error (uses $x + 10$ to calculate width instead of $x - 10$).

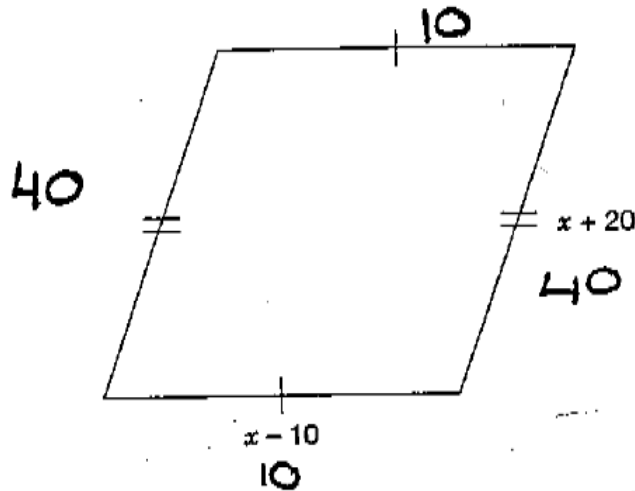
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Applied Winter 2007 Q5

Name: Fabulous Fencing

CODE: 40

Pauline builds a fence around her garden, which is shaped like a parallelogram, as shown below.



Pauline uses 100 metres of fencing along the perimeter of the garden. Find the dimensions of her garden. Show your work.

$$\begin{aligned}
 &20 + 20 \\
 &= 40 \\
 &= 40 \times 2 \\
 &= 80
 \end{aligned}$$

$$\begin{aligned}
 &20 - 10 \\
 &= 10 \\
 &= 10 \times 2 \\
 &= 20
 \end{aligned}$$

$$80 + 20 = 100 \text{ m}$$

∴ The dimensions are length is 10 m width is 40 m

Rationale:

Student demonstrates a thorough understanding of the algebraic concepts and skills; shows $x = 20$ satisfies a total perimeter of 100 m and shows the correct dimensions in the diagram.

Marathon Running (Winter 2007)

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• Off topic: no relationship of written work to the question

Codes	Description
10	Problem-solving process involving the the point of intersection of two linear relations to determine when Lisa will pass her mother shows limited effectiveness due to <ul style="list-style-type: none"> • minimal evidence of a solution process • limited identification of important elements of the problem • too much emphasis on unimportant elements of the problem • no conclusions presented • conclusion presented without supporting evidence
20	Problem-solving process involving the point of intersection of two linear relations to determine when Lisa will pass her mother shows some effectiveness due to <ul style="list-style-type: none"> • an incomplete solution process • identification of some of the important elements of the problem • some understanding of the relationships between important elements of the problem • simple conclusions with little supporting evidence
30	Problem-solving process involving the point of intersection of two linear relations to determine when Lisa will pass her mother shows considerable effectiveness due to <ul style="list-style-type: none"> • a solution process that is nearly complete • identification of most of the important elements of the problem • a considerable understanding of the relationships between important elements of the problem • appropriate conclusions with supporting evidence
40	Problem-solving process involving the point of intersection of two linear relations to determine when Lisa will pass her mother shows a high degree of effectiveness due to <ul style="list-style-type: none"> • a complete solution process • identification of all important elements of the problem • a thorough understanding of the relationships between all of the important elements of the problem • appropriate conclusions with thorough and insightful supporting evidence

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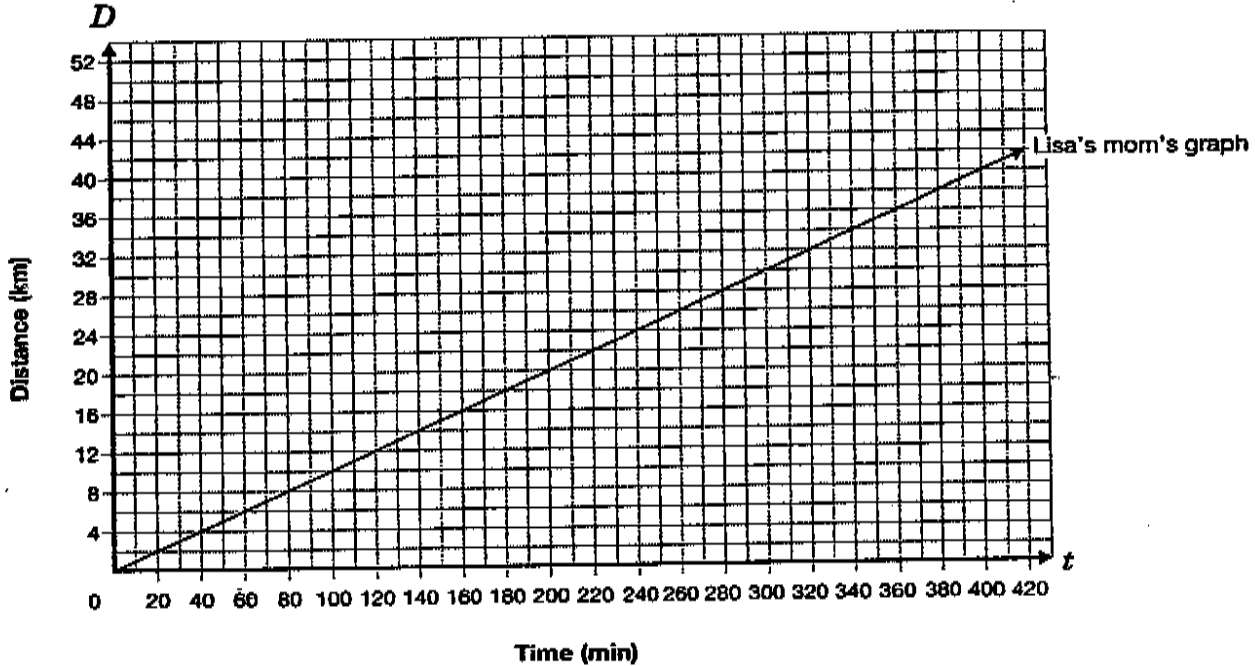
Applied Winter 2007 Q16

Name: Marathon Running

CODE: 10

Lisa and her mom decide to participate in a long-distance race called a marathon. Lisa's mom walks the marathon at an average of 1 kilometre every 10 minutes, as shown by the graph.

Distance vs. Time



Lisa starts the marathon 2 hours after her mom started and averages 1 kilometre every 5 minutes.

When will Lisa pass her mom? Use a graphical model.

Handwritten note: Lisa would pass her mom in about an hour after MOM she got in the race.

LISA

kilometers	time
1	5
2	10
3	15
4	20
5	25
6	30
7	35
8	40
9	45
10	50
11	55
12	60

kilo	time
1	10
2	20
3	30
4	40
5	50
6	60
7	70
8	80
9	90
10	100
11	110
12	120

Rationale:

Student demonstrates minimal evidence of a solution process; extends the chart, but does not relate the conclusion to chart or values.

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Applied Winter 2007 Q16

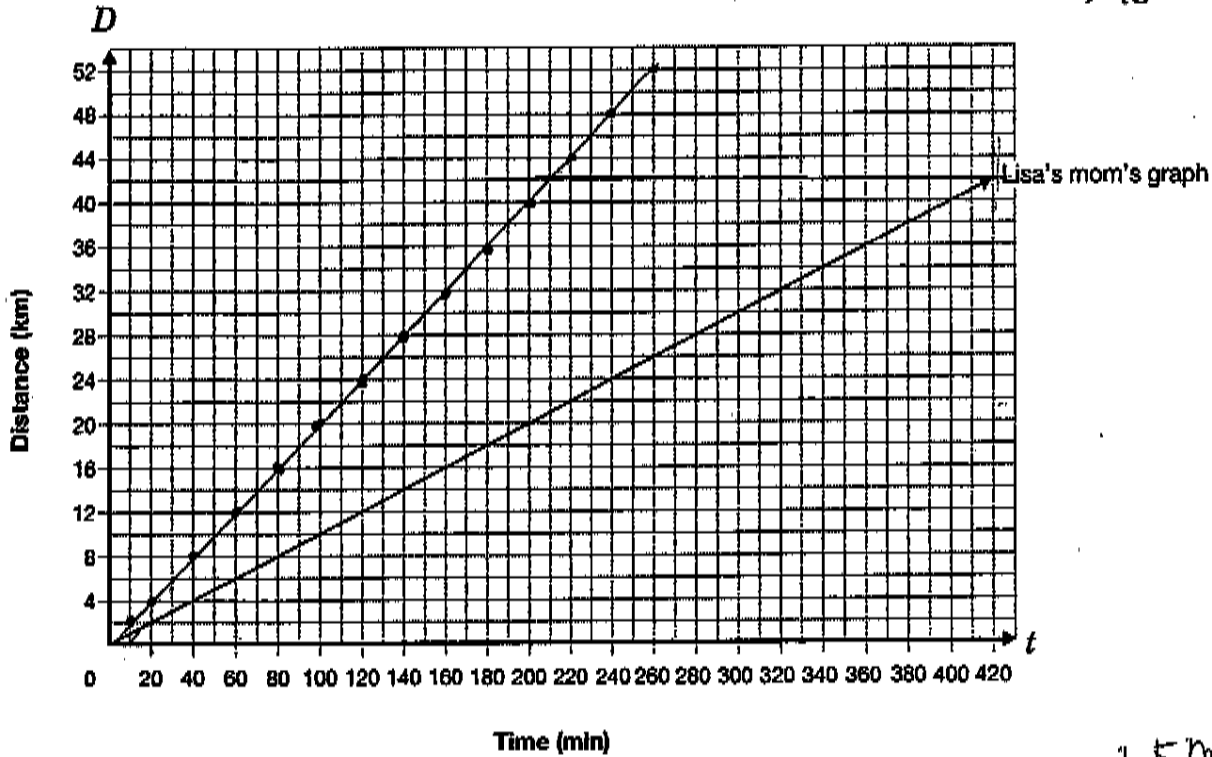
Name: Marathon Running

CODE: 20

Lisa and her mom decide to participate in a long-distance race called a marathon. Lisa's mom walks the marathon at an average of 1 kilometre every 10 minutes, as shown by the graph.

Distance vs. Time

1 Km/10m



1 Km/5m

Lisa starts the marathon 2 hours after her mom started and averages 1 kilometre every 5 minutes.

When will Lisa pass her mom? Use a graphical model.

She will pass her mom at 330 minutes.

$$\begin{array}{r}
 120 \\
 + 210 \\
 \hline
 330
 \end{array}$$

Rationale:

Student demonstrates an identification of some of the important elements of the problem; draws line with correct rate of change and incorrect starting point, determines the time when Lisa passes her mom by adding 2 hours (120 minutes) to answer of 210 km (problem-solving process unclear).

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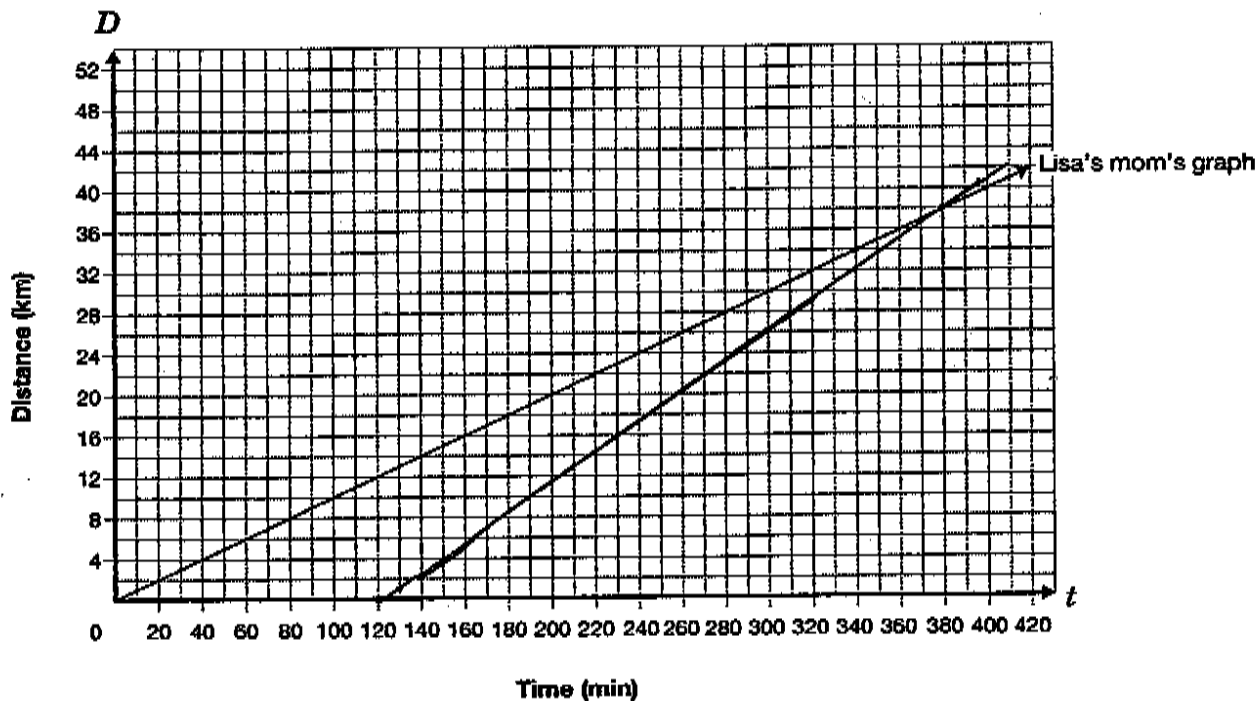
Applied Winter 2007 Q16

Name: Marathon Running

CODE: 30

Lisa and her mom decide to participate in a long-distance race called a marathon. Lisa's mom walks the marathon at an average of 1 kilometre every 10 minutes, as shown by the graph.

Distance vs. Time



Lisa starts the marathon 2 hours after her mom started and averages 1 kilometre every 5 minutes.

When will Lisa pass her mom? Use a graphical model.

start 120 min

1 km / 5 min

∴ She will pass her mom at
approx 38 km

Rationale:

Student demonstrates a considerable understanding of the relationship between important elements of the problem; shows incorrect rate of change (interprets 1 km every 5 minutes incorrectly), but determines correct starting point and interprets point of intersection correctly.

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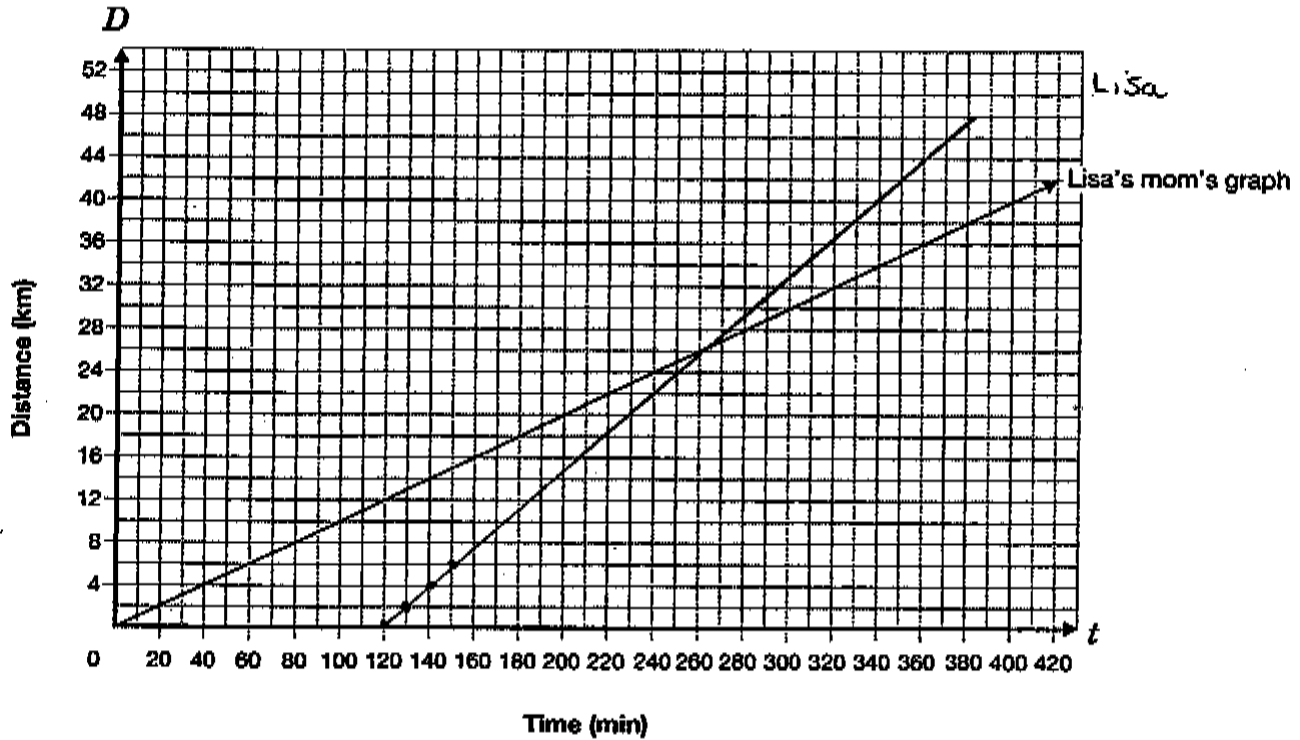
Applied Winter 2007 Q16

Name: Marathon Running

CODE: 40

Lisa and her mom decide to participate in a long-distance race called a marathon. Lisa's mom walks the marathon at an average of 1 kilometre every 10 minutes, as shown by the graph.

Distance vs. Time



Lisa starts the marathon 2 hours after her mom started and averages 1 kilometre every 5 minutes.

When will Lisa pass her mom? Use a graphical model.

Lisa will pass her mom at about 26km.

Rationale:

Student demonstrates a thorough understanding of relationships between all of the important elements of the problem; draws line incorrectly (a little lower than points plotted), but demonstrates using 4 points, an understanding of how to use the rate of change, interprets intersection point appropriately (it is appropriate to reference a distance for when Lisa will pass her mom).

Assessment of Mathematics
 Grade 9 Applied Program
 Specific Open-Response Scoring Guide
Big Bridge (Winter 2007)

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Codes	Description
10	Problem-solving process to determine the area of the side of the bridge shows limited effectiveness due to <ul style="list-style-type: none"> • minimal evidence of a solution process • limited identification of important elements of the problem • too much emphasis on unimportant elements of the problem • no conclusions presented • conclusion presented without supporting evidence
20	Problem-solving process to determine the area of the side of the bridge shows some effectiveness due to <ul style="list-style-type: none"> • an incomplete solution process • identification of some of the important elements of the problem • some understanding of the relationships between important elements of the problem • simple conclusions with little supporting evidence
30	Problem-solving process to determine the area of the side of the bridge shows considerable effectiveness due to <ul style="list-style-type: none"> • a solution process that is nearly complete • identification of most of the important elements of the problem • a considerable understanding of the relationships between important elements of the problem • appropriate conclusions with supporting evidence
40	Problem-solving process to determine the area of the side of the bridge shows a high degree of effectiveness due to <ul style="list-style-type: none"> • a complete solution process • identification of all important elements of the problem • a thorough understanding of the relationships between all of the important elements of the problem • appropriate conclusion (e.g., approximately 132 m²) with thorough and insightful supporting evidence

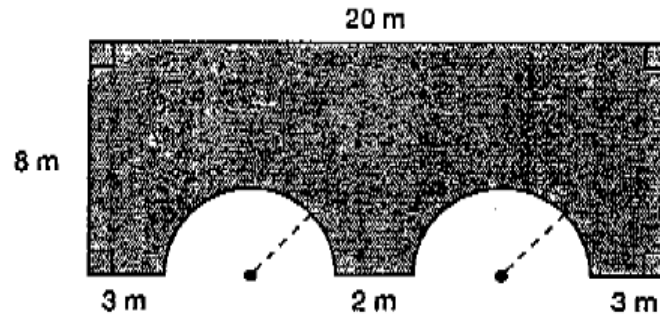
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Applied Winter 2007 Q21

Name: Big Bridge

CODE: 10

The dimensions of a side of a bridge are shown in the diagram below. The arches are semicircles with the same radius.



Determine the area of the side of the bridge shown. Show your work.

$$\begin{aligned} A &= l \times w \\ &= 8 \times 20 \\ &= 160 \text{ m}^2 \end{aligned}$$

Rationale:

Student demonstrates a limited identification of the important elements of the problem; shows a calculation for the area of the outer rectangle, only.

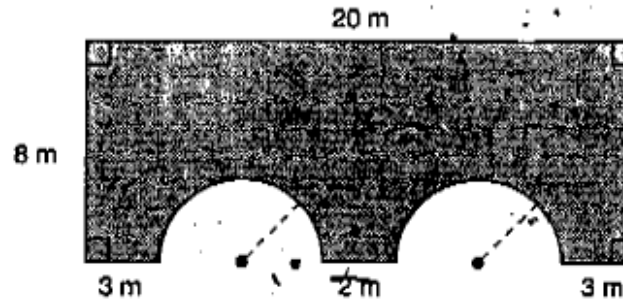
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Applied Winter 2007 Q21

Name: Big Bridge

CODE: 20

The dimensions of a side of a bridge are shown in the diagram below. The arches are semicircles with the same radius.



Determine the area of the side of the bridge shown. Show your work.

$$\begin{aligned}
 A &= \pi r^2 \\
 A &= \pi 6^2 \\
 A &= 18.84^2 \\
 A &= 354.95 \text{ m}^2
 \end{aligned}$$

$$\begin{aligned}
 3 + 2 + 3 &= 8 \\
 20 - 8 &= \frac{12}{2} \\
 &= 6
 \end{aligned}$$

Rationale:

Student demonstrates an incomplete solution process; accurately calculates the diameter, does not determine the radius, and has an error in the calculation of the area.

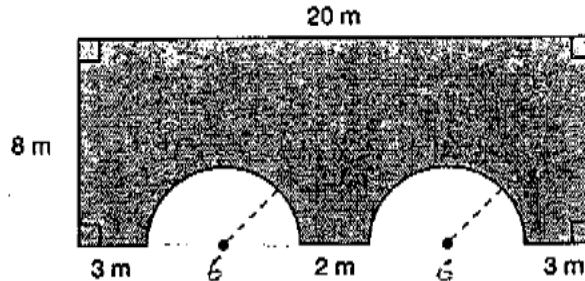
ANCHOR

Applied Winter 2007 Q21

Name: Big Bridge

CODE: 30

The dimensions of a side of a bridge are shown in the diagram below. The arches are semicircles with the same radius.



Determine the area of the side of the bridge shown. Show your work.

$$\begin{aligned}
 A &= L \times w \\
 &= 8 \times 20 \\
 &= 160 \text{ m}^2
 \end{aligned}$$

$$\begin{aligned}
 &160 \text{ m}^2 \\
 &- 56.54 \text{ m}^2 \\
 \hline
 &103.46 \text{ m}^2
 \end{aligned}$$

$$\begin{aligned}
 A &= \pi \times r^2 \\
 &= \pi \times 3^2 \\
 &= \pi \times 9 \\
 &= 28.27
 \end{aligned}$$

$$\begin{array}{r}
 28.27 \\
 \times 2 \\
 \hline
 56.54 \text{ m}^2
 \end{array}$$

The area of this side of the bridge is 103.46 m^2

Rationale:

Student demonstrates a considerable understanding of the relationship between the important elements of the problem; uses accurate problem-solving process, but uses 2 circles to calculate the area of the arches.

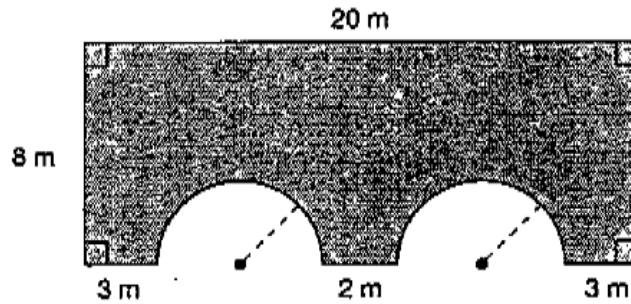
ANCHOR

Applied Winter 2007 Q21

Name: Big Bridge

CODE: 40

The dimensions of a side of a bridge are shown in the diagram below. The arches are semicircles with the same radius.



Determine the area of the side of the bridge shown. Show your work.

$$20 \times 8 = 160$$

$$160 - 24.27$$

Semicircles
area
24.27

$$\text{bridge wall area} = 131.73 \text{ m}^2$$

Rationale:

Student demonstrates a complete problem-solving process; does not show calculations for radius and the area of the arches, but provides correct solution.