

Grade 9

Assessment of Mathematics, Academic Program

RELEASED
**SAMPLE ASSESSMENT
QUESTIONS**

WINTER 2007

Education Quality and
Accountability Office



Sales Goals (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 involving percent to determine Alexis's total weekly sales shows limited effectiveness due to <ul style="list-style-type: none">• misunderstanding of concepts• incorrect selection or misuse of procedures
20	Application of knowledge and skills involving percent to determine Alexis's total weekly sales shows some effectiveness due to <ul style="list-style-type: none">• partial understanding of the concepts• errors and/or omissions in the application of the procedures
30	Application of knowledge and skills involving percent to determine Alexis's total weekly sales shows considerable effectiveness due to <ul style="list-style-type: none">• an understanding of most of the concepts• minor errors and/or omissions in the application of the procedures
40	Application of knowledge and skills involving percent to determine Alexis's total weekly sales shows a high degree of effectiveness due to <ul style="list-style-type: none">• a thorough understanding of the concepts• an accurate application of the procedures (any minor errors and/or omissions do not detract from the demonstration of a thorough understanding)

ANCHOR

Academic Winter 2007 Q5

Name: Sales Goals

CODE: 10

Alexis works part-time at a clothing store. She is paid an hourly rate of \$10.25/h and also earns a commission of 3.5% of her total weekly sales.

Alexis works at the store 12 hours a week.

If Alexis's goal is to earn \$150 every week, what do her total weekly sales need to be?

Show your work.

$$10.25\$ \times 12h \times 3.5\% \div 150 =$$
$$2,87\$$$

Rationale:

Student demonstrates incorrect selection of procedures; puts numbers from the question into an inappropriate numerical expression.

ANCHOR

Academic Winter 2007 Q5

Name: Sales Goals

CODE: 20

Alexis works part-time at a clothing store. She is paid an hourly rate of \$10.25/h and also earns a commission of 3.5% of her total weekly sales.

Alexis works at the store 12 hours a week.

If Alexis's goal is to earn \$150 every week, what do her total weekly sales need to be?

Show your work.

$$12 \times 10.25 = 123$$

$$150 - 123 = 27$$

Rationale:

Student demonstrates a partial understanding of the concepts; calculates \$27 commission required, but does not incorporate 3.5% commission rate to find out the amount of sales required.

ANCHOR

Academic Winter 2007 Q5

Name: Sales Goals

CODE: 30

Alexis works part-time at a clothing store. She is paid an hourly rate of \$10.25/h and also earns a commission of 3.5% of her total weekly sales.

Alexis works at the store 12 hours a week.

If Alexis's goal is to earn \$150 every week, what do her total weekly sales need to be?

Show your work.

$P = \text{pay}$
 $w = \text{weekly sales}$

$$P = 10.25h + 3.5w$$

$$150 = 10.25 \times 12 + 3.5w$$

$$150 - 123 = \cancel{123} - \cancel{123} + 3.5w$$

$$\frac{27}{3.5} = \frac{3.5w}{3.5}$$

$$7.71 = w$$

\therefore her weekly sales must have to be \$7.71 in order for her to make \$150.00 per week.

Rationale:

Student demonstrates minor errors in the application of the procedures; does not convert 3.5% to a decimal or fraction before dividing, which results in an unreasonable amount for total weekly sales.

ANCHOR

Academic Winter 2007 Q5

Name: Sales Goals

CODE: 40

Alexis works part-time at a clothing store. She is paid an hourly rate of \$10.25/h and also earns a commission of 3.5% of her total weekly sales.

Alexis works at the store 12 hours a week.

If Alexis's goal is to earn \$150 every week, what do her total weekly sales need to be?

Show your work.

$x = \text{weekly sale}$ $h = \text{hour of work}$ $0.035x = \text{money earned for sale}$

$$150 = \$10.25h + 0.035x$$

$$150 = \$10.25(12) + 0.035x$$

$$150 = 123 + 0.035x$$

$$150 - 123 = 123 - 123 + 0.035x$$

$$28 = 0.035x$$

$$28/0.035 = 0.035x/0.035$$

$$\underline{800} = x$$

Answer: Alexis need to have weekly sale of \$300 to earn \$150 per week.

Rationale:

Student demonstrates an accurate application of the procedures; minor errors in arithmetic ($150 - 123 = 28$) do not detract from the demonstration of a thorough understanding.

Population Plans (Winter 2007)

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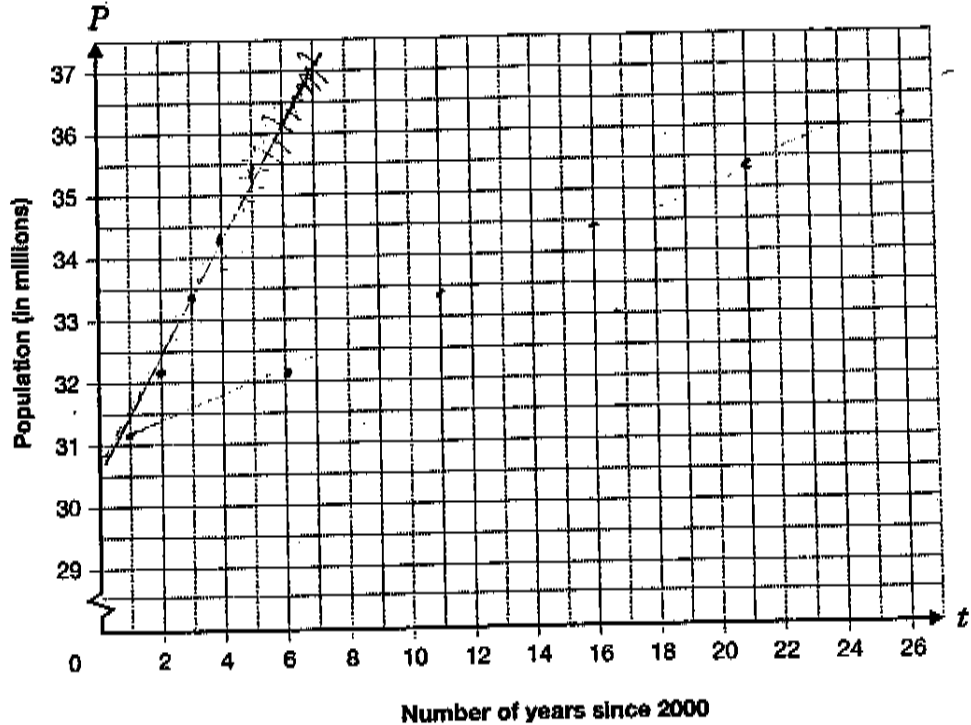
• Off topic: no relationship of written work to the question

Codes	Description
10	Problem-solving process involving an algebraic model to determine a prediction of the population in 2036 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 an algebraic model to determine a prediction of the population in 2036 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 an algebraic model to determine a prediction of the population in 2036 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 an algebraic model to determine a prediction of the population in 2036 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

Nina is researching the population of Canada. She finds data for the year 2001 and predictions for every 5 years after that, as shown below.

Population vs. Number of Years Since 2000

Number of years since 2000, t	Population (in millions), P
1	31.1 ✓
6	32.2 ✓
11	33.4 ✓
16	34.4 ✓
21	35.4 ✓
26	36.2



Determine an algebraic model for Nina's data, and use it to make a reasonable prediction for the population of Canada in 2036.

Justify your answer.

I used a scatter plot to predict that by 2036 there will be a population of ~~36.2~~ 45.6.

Rationale:

Student's problem-solving process demonstrates minimal evidence of a solution process; provides no supporting evidence, as even though graph is drawn, it is not possible to extend graph to 2036.

ANCHOR

Academic Winter 2007 Q10

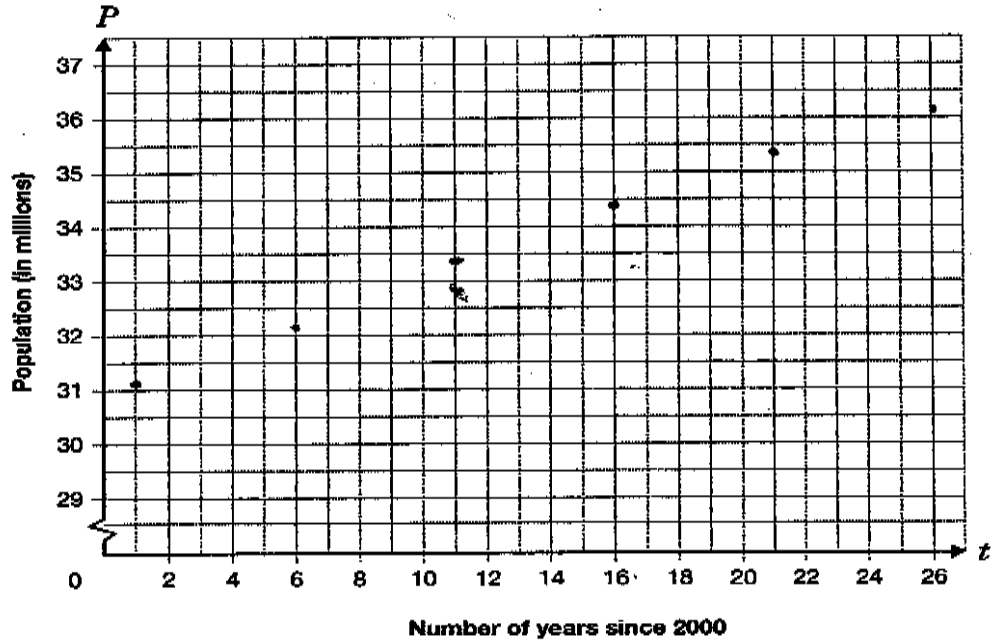
Name: Population Plans

CODE: 20

Nina is researching the population of Canada. She finds data for the year 2001 and predictions for every 5 years after that, as shown below.

Population vs. Number of Years Since 2000

Number of years since 2000, t	Population (in millions), P
1	31.1
6	32.2
11	33.4
16	34.4
21	35.4
26	36.2



Determine an algebraic model for Nina's data, and use it to make a reasonable prediction for the population of Canada in 2036.

Justify your answer.

$$P = \frac{1.07222}{5}t + 30,000,000$$

$$2036 - 38.4$$

Rationale:

Student's problem-solving process demonstrates an incomplete solution process; student provides no evidence of how algebraic model was determined (no line on graph to support y-intercept and no evidence of which points were used to determine the slope); also provides no evidence of how prediction was calculated.

ANCHOR

Academic Winter 2007 Q10

Name: Population Plans

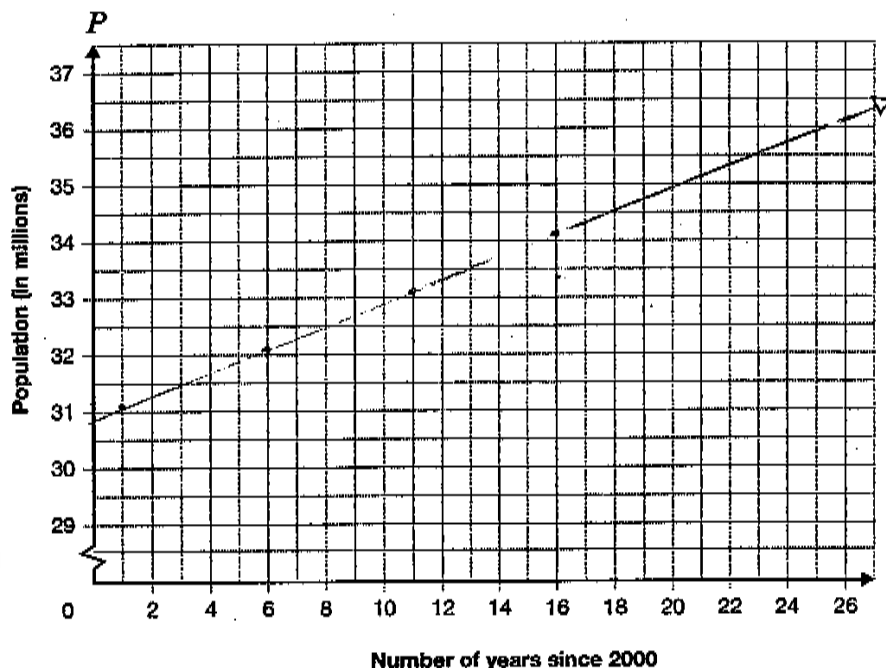
CODE: 30

Nina is researching the population of Canada. She finds data for the year 2001 and predictions for every 5 years after that, as shown below.

Population vs. Number of Years Since 2000

Number of years since 2000, t	Population (in millions), P
1	31.1
6	32.2
11	33.4
16	34.4
21	35.4
26	36.2

31	37
36	38



Determine an algebraic model for Nina's data, and use it to make a reasonable prediction for the population of Canada in 2036.

Justify your answer.

$A(6, 32.2)$ $B(26, 36.2)$

\therefore the algebraic model is $y = \frac{1}{5}x + 31.1$.

$$\text{Slope } AB = \frac{\Delta y}{\Delta x} = \frac{32.2 - 36.2}{6 - 26} = \frac{-4}{-20} = \frac{4}{20} = \frac{1}{5}$$

$$\begin{aligned}
 y &= \frac{1}{5}x + 31.1 \\
 &= \frac{1}{5}(36) + 31.1 \\
 &= 38.3
 \end{aligned}$$

\therefore the population of Canada in 2036 will be approximately 38.3 million because every 5 years, the population increases about 1 million.

Rationale:

Student's problem-solving process demonstrates a considerable understanding of the relationships between all the important elements of the problem; student determines an algebraic model and plots graph; shows evidence of points used for the slope (on the line), but uses value for y-intercept when $t = 1$, not $t = 0$. Student uses their algebraic model used to determine population.

ANCHOR

Academic Winter 2007 Q10

Name: Population Plans

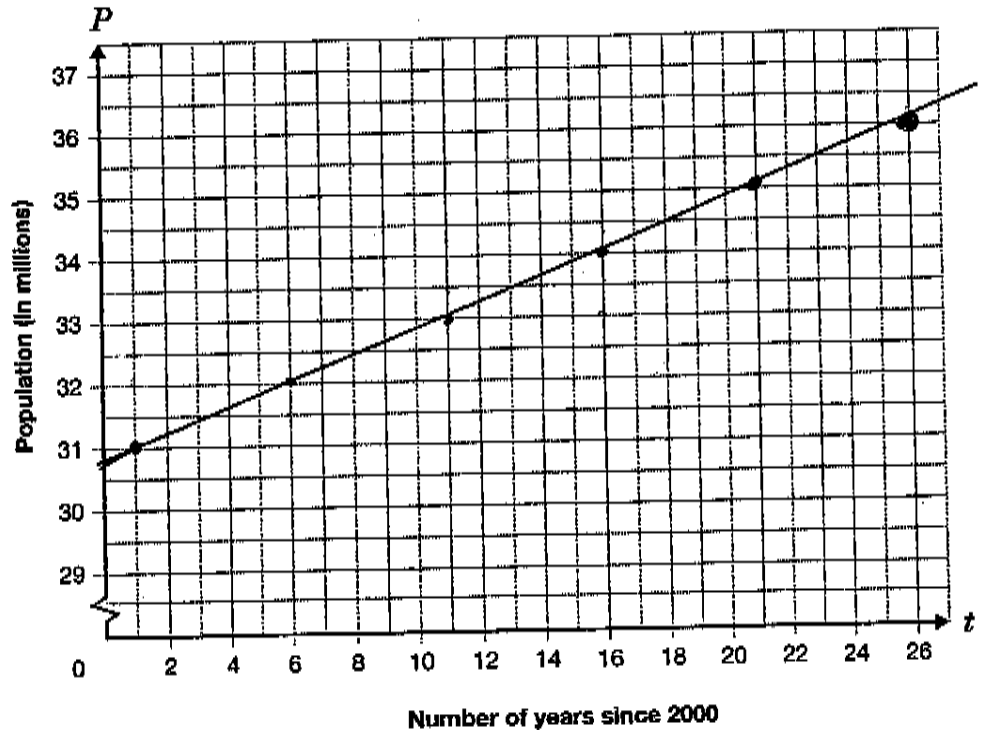
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Nina is researching the population of Canada. She finds data for the year 2001 and predictions for every 5 years after that, as shown below.

Population vs. Number of Years Since 2000

Number of years since 2000, t	Population (in millions), P
1	31.1
6	32.2
11	33.4
16	34.4
21	35.4
26	36.2

31 37
36 30



Determine an algebraic model for Nina's data, and use it to make a reasonable prediction for the population of Canada in 2036.

Justify your answer.

$$0.22(36) + 30.7 = x \quad (1, 31.1)$$

$$7.92 + 30.7 = 38.6 \quad (6, 32.2)$$

The population in 2036
will be 38.6 million.

$$\frac{32.2 - 31.1}{6 - 1} = \frac{1.1}{5}$$

0.22

Rationale:

Student's problem-solving process demonstrates a thorough understanding of the relationship between all of the important elements of the problem; student does not express model with all correct variables, but it is evident that slope and y-intercept the students uses to make a prediction have been identified, and that the y-intercept matches the value on the graph, and the points used to determine the slope are shown on the line drawn on the graph.

To Colour or Not to Colour (Winter 2007)

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

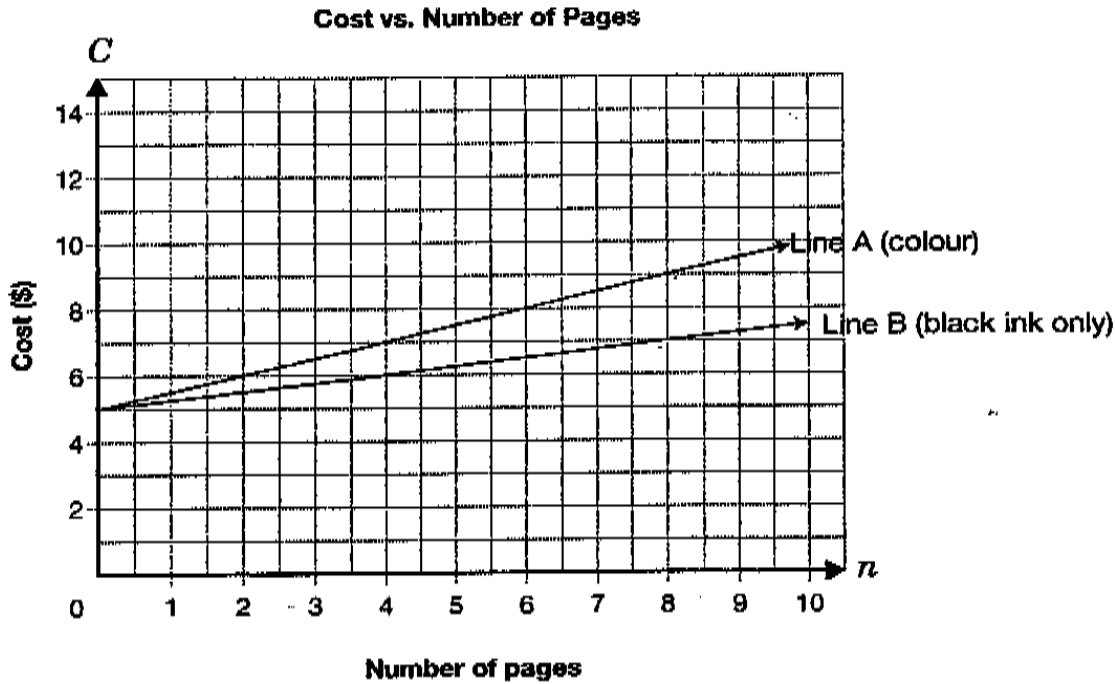
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• Off topic: no relationship of written work to the question

Codes	Description
10	Problem-solving process to determine the difference in cost between printing 500 pages in colour and black and white 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 difference in cost between printing 500 pages in colour and black and white 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 difference in cost between printing 500 pages in colour and black and white 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 difference in cost between printing 500 pages in colour and black and white 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

The graph below shows the cost to print a document at the Graphics Shop. Line A represents the cost of printing the document in colour. Line B represents the cost to print it with black ink only.



For a 500-page document, how much more will it cost to print in colour than with black ink only?

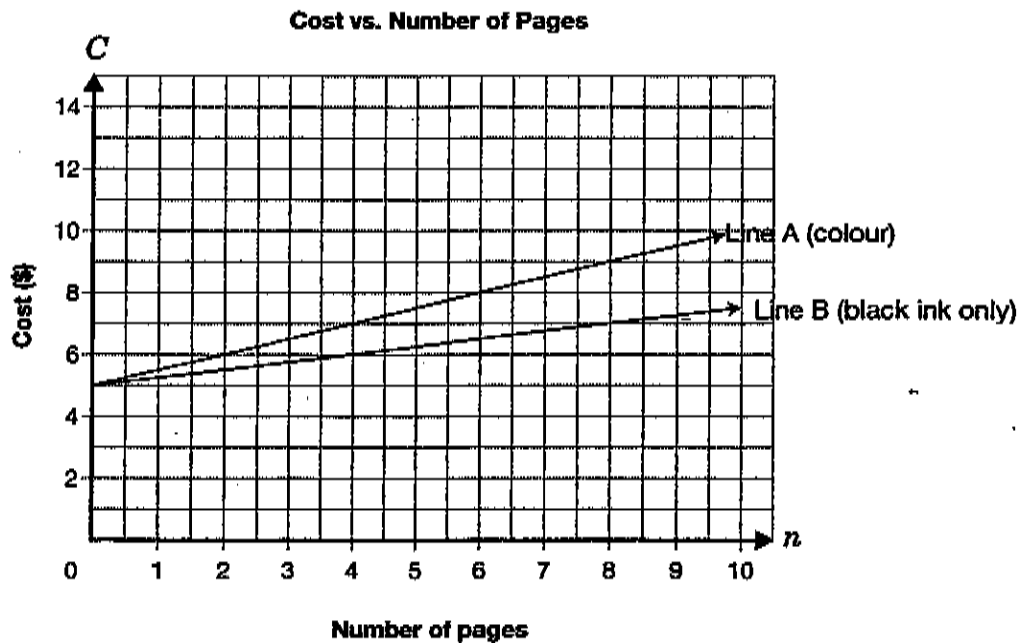
Show your work.

Colour - 4 pages = \$7.00 - 8 pgs. = \$9.00 - 16 pgs. = \$13.00
 Black - 4 pages = \$6.00 - 8 pgs. = \$7.00 - 16 pgs. = \$8.00

Rationale:

Student's problem-solving process demonstrates minimal evidence of a solution process; student starts comparing costs for both types of printing from the graph but does not get close to 500 pages.

The graph below shows the cost to print a document at the Graphics Shop. Line A represents the cost of printing the document in colour. Line B represents the cost to print it with black ink only.



For a 500-page document, how much more will it cost to print in colour than with black ink only?

Show your work.

$$\begin{aligned} & \text{colour cost} \\ \$ & 6 \text{ for } 2 \times 50 \\ & = \$300 \end{aligned}$$

$$\begin{aligned} & \text{black ink cost} \\ \$ & 6 \text{ for } 4 \times 25 \\ & = 150 \end{aligned}$$

Difference cost

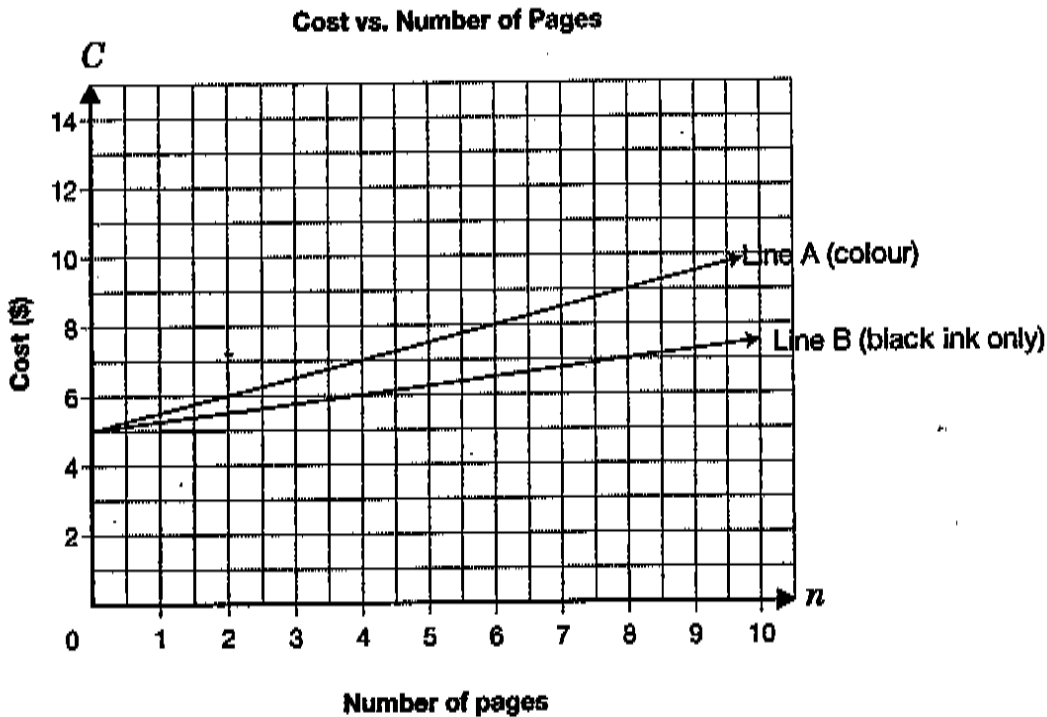
$$\begin{aligned} C_D &= \text{colour cost} - \text{black ink cost} \\ &= 300 - 150 \\ &= \$150 \end{aligned}$$

\therefore It will cost \$150 more to print colour.

Rationale:

Student's problem-solving process demonstrates some understanding of the relationships between the important elements of the problem; student deals with costs as a direct variation and considers only 100 copies.

The graph below shows the cost to print a document at the Graphics Shop. Line A represents the cost of printing the document in colour. Line B represents the cost to print it with black ink only.



For a 500-page document, how much more will it cost to print in colour than with black ink only?

Show your work.

$$\begin{aligned} \text{Total cost} &= \frac{1}{4}(500) + 5 \\ \text{for colour} &= 125 + 5 \\ &= \$130 \end{aligned}$$

$$\begin{aligned} \text{Total cost} &= \frac{1}{2}(500) + 5 \\ \text{for Black Ink} &= \frac{125}{2} + 5 \\ &= 62.5 + 5 \\ &= 67.5 \end{aligned}$$

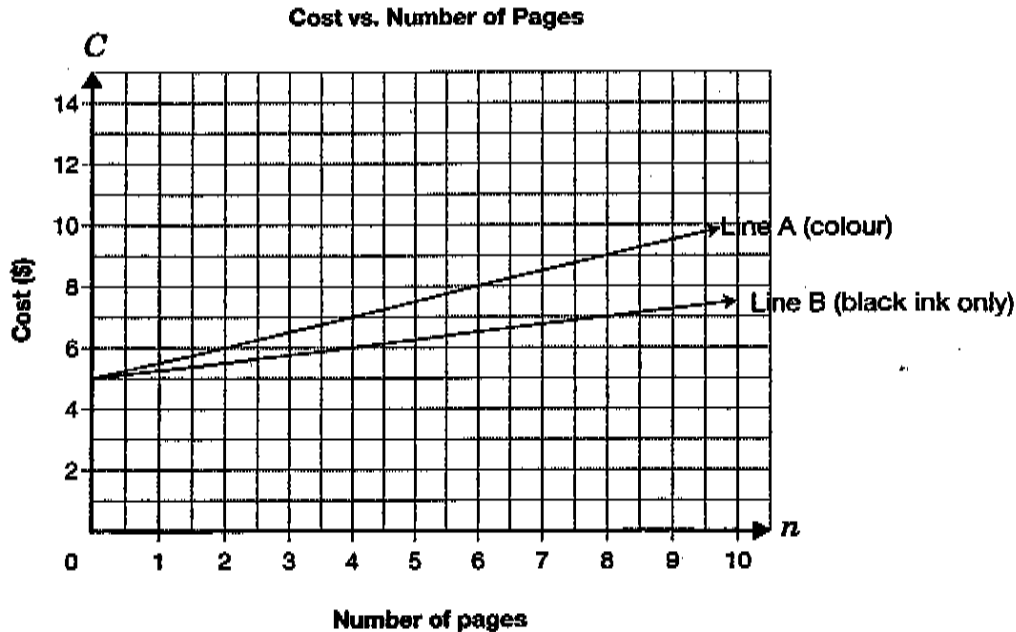
$$130 - 67.5 = 62.5$$

∴ It will cost \$62.5 more dollars to print in colour than black ink.

Rationale:

Student's problem-solving process demonstrates considerable understanding of the relationships between the important elements of the problem; student uses incorrect scale when calculating the slopes of the lines (cost per page); remainder of the solution is accurate.

The graph below shows the cost to print a document at the Graphics Shop. Line A represents the cost of printing the document in colour. Line B represents the cost to print it with black ink only.



For a 500-page document, how much more will it cost to print in colour than with black ink only?

Show your work.

$$C_{\text{Colour}} = 4.50 + 0.5p$$

$$C_{\text{Black}} = 4.50 + 0.25p$$

$$\therefore C_{\text{Colour}} = 4.50 + 0.5(500)$$

$$= 4.50 + 250$$

$$= \boxed{\$254.50}$$

$$= 4.50 + 0.25(500)$$

$$= 4.50 + 125$$

$$= \boxed{\$129.50}$$

$$\begin{array}{r} 254.50 \\ - 129.50 \\ \hline \boxed{\$125} \end{array}$$

\therefore It costs \$125 more to print in colour than in black ink.

Rationale:

Student's problem-solving process demonstrates a complete solution process; student uses a y-intercept that is incorrect but reasonable and identical in both equations; difference and cost calculations are accurate and complete.

Geometric Quilts (Winter 2007)

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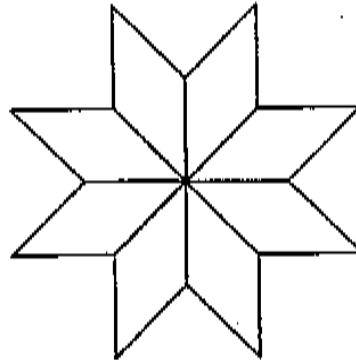
• Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, "?", "!", "I don't know")

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

Codes	Description
10	Problem-solving process to determine whether the quilt piece can be used to form an eight-pointed star 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 whether the quilt piece can be used to form an eight-pointed star 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 whether the quilt piece can be used to form an eight-pointed star 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 whether the quilt piece can be used to form an eight-pointed star 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

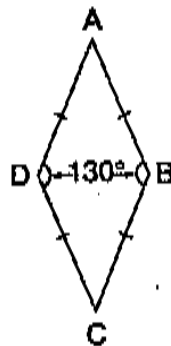
Paul's grandmother wants to use quilt pieces to make an **eight-pointed star** like the one shown.

Eight-Pointed Star



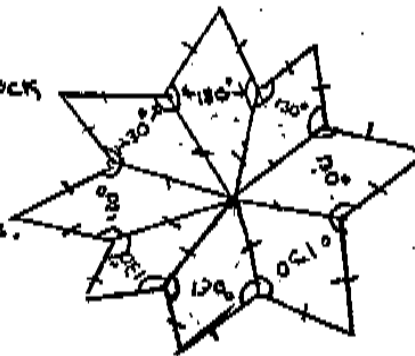
Her quilt pieces are in the shape of a rhombus with two angles of 130° .

Quilt Piece



Is it possible to make an **eight-pointed star** using copies of her quilt piece?
Justify your answer.

yes she will be able to
because they will all interlock
as shown →.
To create a star that has 8
rhombuses with 130° . That
fit together perfectly 8 times.

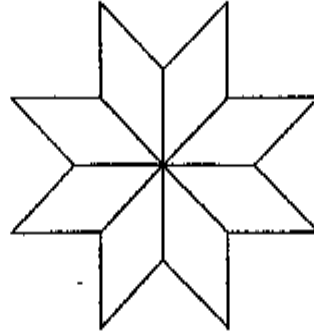


Rationale:

Student's problem-solving process shows limited effectiveness due to minimal evidence of a solution process; student uses a diagram only, with given information.

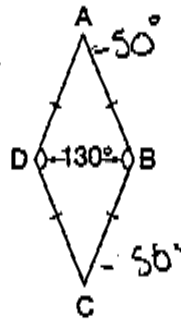
Paul's grandmother wants to use quilt pieces to make an **eight-pointed star** like the one shown.

Eight-Pointed Star



Her quilt pieces are in the shape of a rhombus with two angles of 130° .

Quilt Piece



Is it possible to make an **eight-pointed star** using copies of her quilt piece?

Justify your answer.

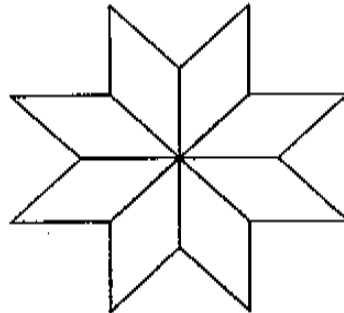
It is possible to make an eight-pointed star using copies of her quilt piece because the copies all equal 360°

Rationale:

Student's problem-solving process shows some effectiveness due to an incomplete solution process; student calculates 50° inside a single rhombus but does not consider 8 points in the star.

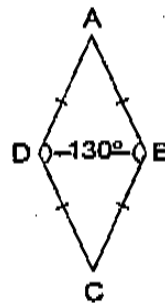
Paul's grandmother wants to use quilt pieces to make an **eight-pointed star** like the one shown.

Eight-Pointed Star



Her quilt pieces are in the shape of a rhombus with two angles of 130° .

Quilt Piece



Is it possible to make an **eight-pointed star** using copies of her quilt piece?
Justify your answer.

$$130 \times 2 = 260$$

$$360 - 260 = 100 \div 2 = 50$$

$$\angle A, \angle B = 50^\circ$$

$$50 \times 8 = 400^\circ$$

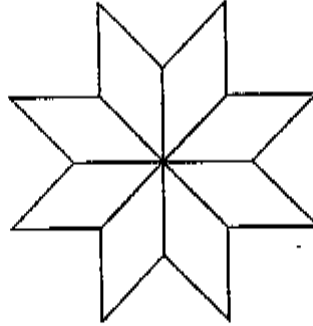
No she can't make the star.

Rationale:

Student's problem-solving process shows considerable effectiveness due to a considerable understanding of the relationships between important elements of the problem; student does not justify why 400° is incorrect.

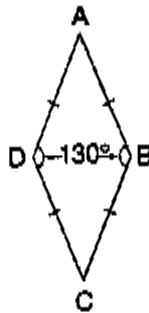
Paul's grandmother wants to use quilt pieces to make an **eight-pointed star** like the one shown.

Eight-Pointed Star



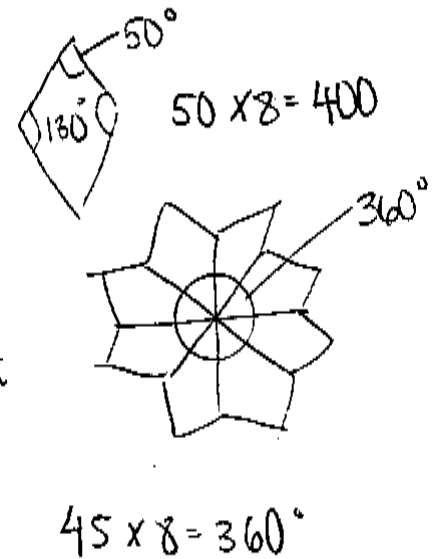
Her quilt pieces are in the shape of a rhombus with two angles of 130° .

Quilt Piece



Is it possible to make an **eight-pointed star** using copies of her quilt piece?
Justify your answer.

It is not possible to make an eight-pointed star. The star should form a circle in the middle that will be equivalent to 360° . The quilt piece has an angle of 50° . To have eight of these pieces would be too much is would equal 400° . The angle must be smaller. The angle must be 45° to make the star work.



Rationale:

Student's problem-solving process shows a high degree of effectiveness due to a complete solution process; student provides thorough and insightful supporting evidence.