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Education Bureau
Territory-wide System Assessment 2012
Secondary 3
Mathematics
QUESTION BOOKLET

INSTRUCTIONS

1. There are 51 questions in this paper.
2. The time allowed is 65 minutes.
3. Answer ALL questions in the separate ANSWER BOOKLET.
4. The use of HKEAA approved calculators is permitted.
5. Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.
6. Rough work should be done on the rough work sheet provided.
7. The diagrams in this paper are not necessarily drawn to scale.

FORMULAS FOR REFERENCE

Sector	Arc length	$= 2\pi r \times \frac{\theta}{360^\circ}$
	Area	$= \pi r^2 \times \frac{\theta}{360^\circ}$
Sphere	Surface area	$= 4\pi r^2$
	Volume	$= \frac{4}{3}\pi r^3$
Cylinder	Curved surface area	$= 2\pi rh$
	Volume	$= \pi r^2 h$
Cone	Curved surface area	$= \pi rl$
	Volume	$= \frac{1}{3}\pi r^2 h$
Prism	Volume	$= \text{base area} \times \text{height}$
Pyramid	Volume	$= \frac{1}{3} \times \text{base area} \times \text{height}$

SECTION A: Choose the best answer for each question.
 You should mark all your answers in the ANSWER BOOKLET.

1. Calculate $\frac{6 - (-6)}{-6}$.

- A. -6
- B. -2
- C. 5
- D. 6

2. Which of the following numbers **CANNOT** be the product of 2 two-digit numbers?

$$\begin{array}{r}
 \square \square \\
 \times \square \square \\
 \hline
 \boxed{\text{Product}}
 \end{array}$$

- A. 187
- B. 1849
- C. 6351
- D. 10201

3. The diameter of the Earth is about 13 000 000 m. Use scientific notation to represent this number.

- A. 1.3×10^6 m
- B. 13×10^6 m
- C. 1.3×10^7 m
- D. 13×10^7 m

4. Which of the following is **INCORRECT**?

- A. $11 < \sqrt{130}$
- B. $12 < \sqrt{150}$
- C. $13 < \sqrt{170}$
- D. $14 < \sqrt{190}$

5. The saving of Alan is \$A. Betty's saving is twice Alan's saving. After Betty spent \$1 000, how much did she have?

- A. $\$(2A - 1\,000)$
- B. $\$(2A + 1\,000)$
- C. $\$\left(\frac{A}{2} - 1\,000\right)$
- D. $\$\left(\frac{A}{2} + 1\,000\right)$

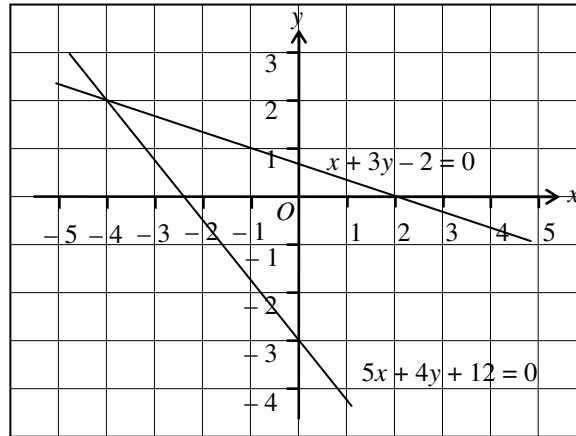
6. Which of the following polynomials has two like terms?

- A. $2x + 2y$
- B. $2xy - 4xy$
- C. $2x + 4x^2$
- D. $2xy - 2y$

7. Simplify $7x^2 + 5x^2$.

- A. $35x^4$
- B. $12x^4$
- C. $35x^2$
- D. $12x^2$

8.



The above figure shows the graphs of $5x + 4y + 12 = 0$ and $x + 3y - 2 = 0$.

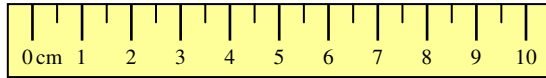
Solve $\begin{cases} 5x + 4y + 12 = 0 \\ x + 3y - 2 = 0 \end{cases}$ graphically.

- A. $(2, -4)$
- B. $(-4, 2)$
- C. $(2, 0)$
- D. $(0, -3)$

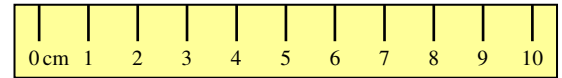
9. If $x > y$, which of the following inequalities is correct?

- A. $3x < 3y$
- B. $\frac{x}{-3} > \frac{y}{-3}$
- C. $x + 3 < y + 3$
- D. $x - 3 > y - 3$

10.



Ruler A

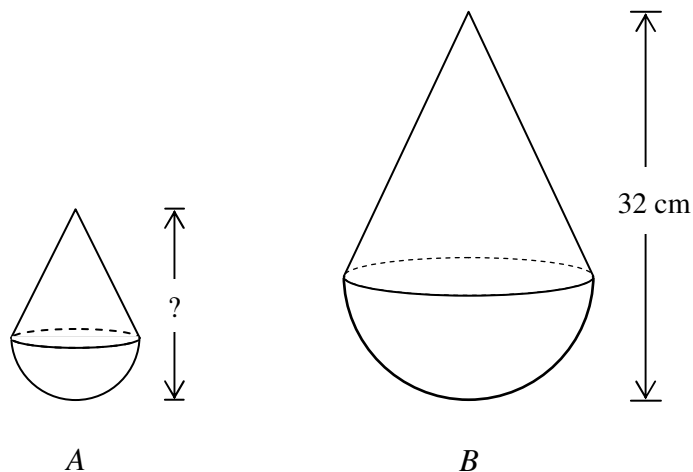


Ruler B

The above figure shows ruler A and ruler B with different graduations. Thomas wants to find the thickness of a ten-cent coin. Of the following methods, which one is the best?

- A. Thomas measures the thickness of a ten-cent coin using ruler A.
- B. Thomas measures the thickness of a ten-cent coin using ruler B.
- C. Thomas measures the thickness of 50 ten-cent coins using ruler A and then divides the thickness by 50.
- D. Thomas measures the thickness of 50 ten-cent coins using ruler B and then divides the thickness by 50.

11. In the figure, A and B are two similar solids. The volumes of A and B are $V \text{ cm}^3$ and $8V \text{ cm}^3$ respectively. If the height of B is 32 cm, find the height of A.

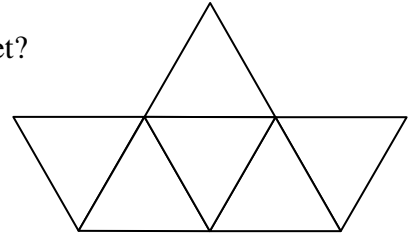


- A. 16 cm
- B. 8 cm
- C. 4 cm
- D. 2 cm

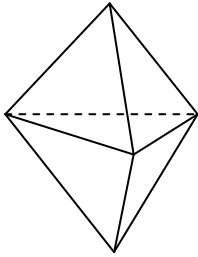
12. Which of the following descriptions of cubes is **INCORRECT**?

- A. All the faces of a cube are squares of the same size.
- B. All the edges of a cube are equal in length.
- C. All cuboids are cubes.
- D. All cubes are regular polyhedra.

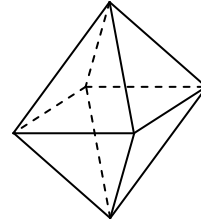
13. Which of the following 3-D figures can be made by the given net?



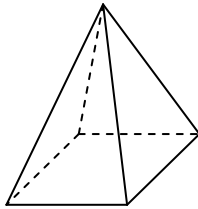
A.



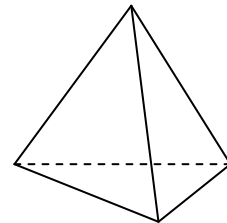
B.



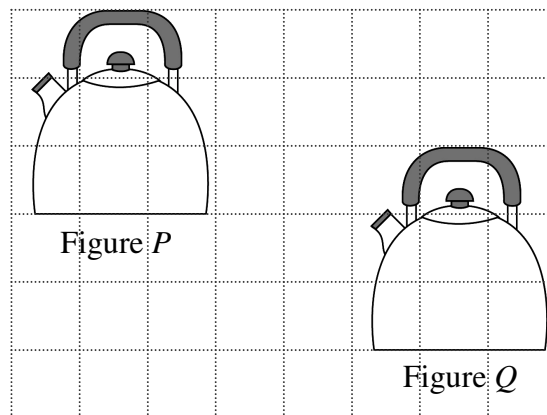
C.



D.



14. Figure P is changed to Figure Q after a single transformation.

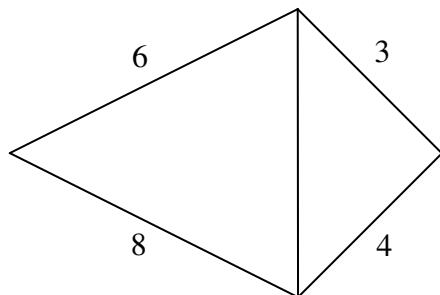


The transformation is

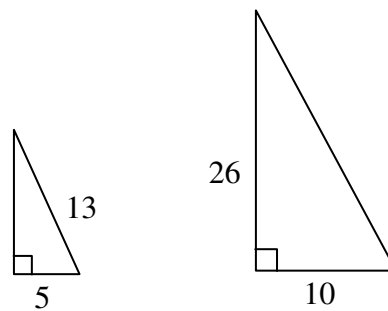
- A. rotation.
- B. enlargement.
- C. translation.
- D. reflection.

15. Which of the following figures shows two similar triangles?

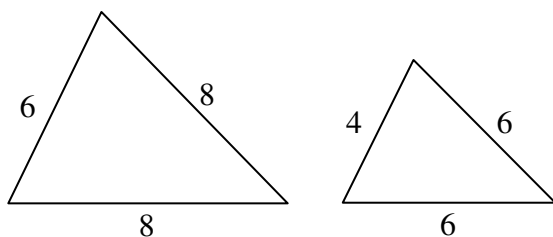
A.



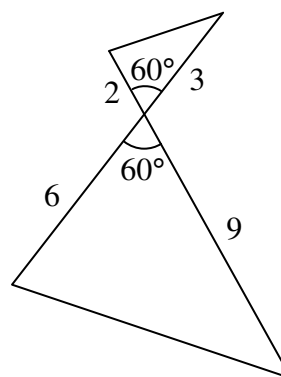
B.



C.

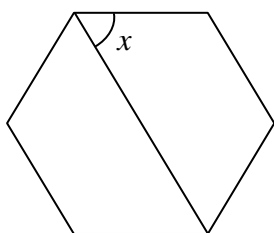


D.

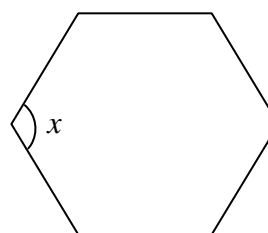


16. In which of the following figures, x is an interior angle of a hexagon?

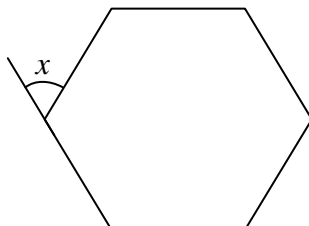
A.



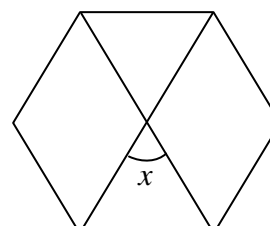
B.



C.

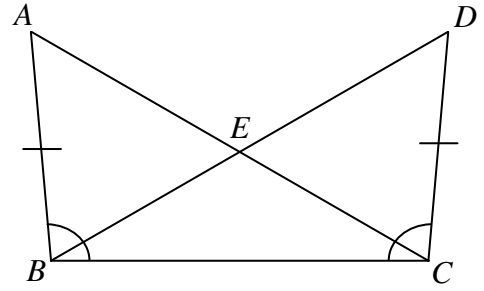


D.



17. In the figure, AEC and DEB are straight lines,
 $AB = DC$ and $\angle ABC = \angle DCB$.
 Prove that $\triangle ABC \cong \triangle DCB$.

Which of the following proofs is correct?



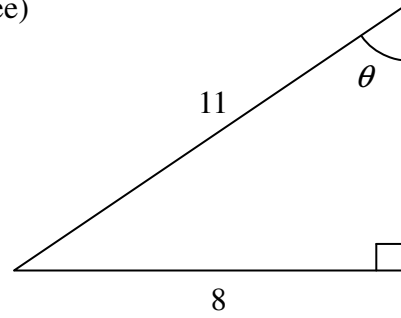
- | | |
|---|---|
| <p>A. $AC = DB$ (given)
 $AB = DC$ (given)
 $\angle ABC = \angle DCB$ (given)
 $\therefore \triangle ABC \cong \triangle DCB$ (RHS)</p> | <p>B. $AC = DB$ (given)
 $AB = DC$ (given)
 $BC = CB$ (common side)
 $\therefore \triangle ABC \cong \triangle DCB$ (SSS)</p> |
| <p>C. $AB = DC$ (given)
 $\angle ABC = \angle DCB$ (given)
 $BC = CB$ (common side)
 $\therefore \triangle ABC \cong \triangle DCB$ (SAS)</p> | <p>D. $AB = DC$ (given)
 $\angle ABC = \angle DCB$ (given)
 $\angle ACB = \angle DBC$ (corr. \angles, $\cong \triangle$s)
 $\therefore \triangle ABC \cong \triangle DCB$ (AAS)</p> |

18. $A(-2, 4)$ and $B(11, -1)$ are two points on straight line L in a rectangular coordinate plane. Find the slope of L .

- A. $\frac{5}{-13}$
 B. $\frac{-13}{5}$
 C. $\frac{1}{3}$
 D. 3

19. Refer to the figure, find θ . (Correct to the nearest degree)

- A. 54°
- B. 47°
- C. 43°
- D. 36°



20. After organizing the data of the blood pressure of 60 patients, a nurse has constructed a frequency distribution table as below.

Blood pressure (mmHg)	110 – 119	120 – 129	130 – 139	140 – 149	150 – 159	160 – 169
Frequency	3	14	20	12	7	4

Which of the following is suitable to present the data in the above table?

- A. Histogram
- B. Scatter diagram
- C. Broken line graph
- D. Stem-and-leaf diagram

SECTION B: Write ALL the answers in the ANSWER BOOKLET.

Working need not be shown.

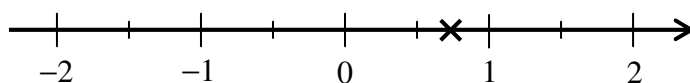
21. William uses a positive number to represent an amount deposited in a bank and a negative number to represent an amount withdrawn from the bank. Use a directed number to represent the deposit or withdrawal.

- (i) A withdrawal of 900 dollars.
- (ii) A deposit of 1500 dollars.

22. (a) Calculate $-4 - 2(-3)$.
(b) Calculate $-4 + 2(-3)$.

23. Use the symbol 'x' to mark the number $\frac{8}{3}$ on the number line given in the **ANSWER BOOKLET**.

Example: $\frac{3}{4}$ is marked on the number line below.



24. Calvin and Tim are 15 and 21 years old respectively. Find the ratio of their ages after 3 years.

25. The profit (\$ P) of selling toy trains by a company can be calculated by the following formula:

$P = 80n - 1\,200$, where n is the number of toy trains sold.

If $P = 6\,000$, find the value of n .

26. The n^{th} term of a sequence is $n^3 - 1$. Find the value of the 3rd term of the sequence.

27. Expand $(x - 2y)(-xy)$.

28. Factorize $x^2 - 8x + 16$.

29. Solve $3(x + 4) = -x$.

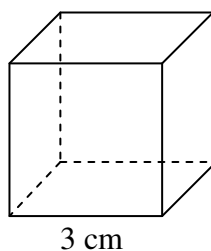
30. Expand $(x+2)^2$.

31. In the **ANSWER BOOKLET**, fill in the boxes with $>$ or $<$ to express the relations between the numbers.

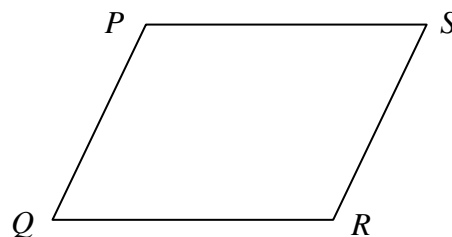
i. -5.5 -5.7

ii. -0.5 -0.05

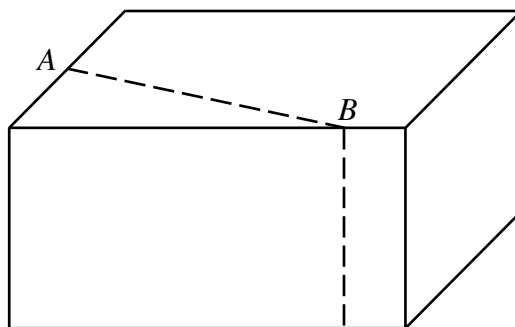
32. The figure shows a solid cube of side 3 cm. Find the total surface area of the cube.



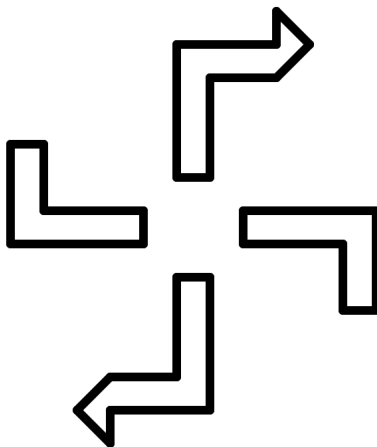
33. Use the given letters to name the parallelogram on the right.



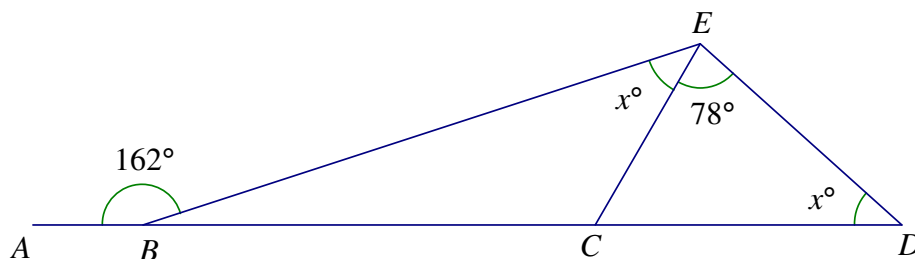
34. A cuboid is placed horizontally as shown. Sketch the cross-section of the cuboid in the **ANSWER BOOKLET** if it is cut vertically along the dotted line AB .



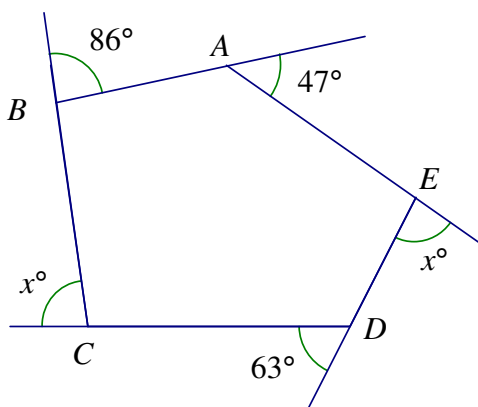
35. The figure below has rotational symmetry. Find its order of rotational symmetry.



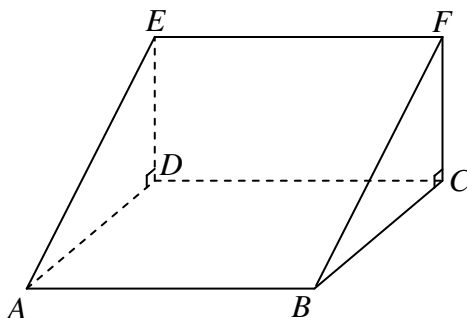
36. In the figure, $ABCD$ is a straight line, $\angle ABE = 162^\circ$ and $\angle CED = 78^\circ$. Find the value of x .



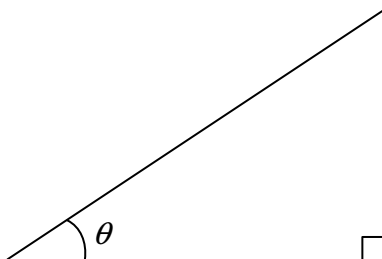
37. The figure shows a pentagon $ABCDE$. Find the value of x .



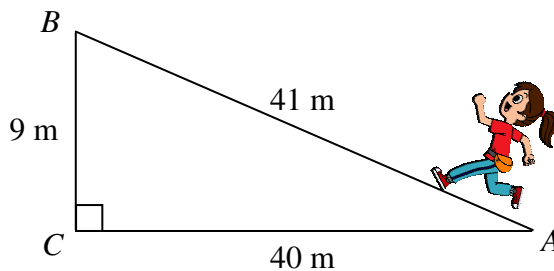
38. The figure shows a triangular prism. $ABCD$ and $CFED$ are rectangles. $ABCD$ is a horizontal plane and $CFED$ is a vertical plane. Name the projection of AE on the plane $CFED$.



39. In the figure, $\cos \theta = \frac{5}{6}$. Find θ . (Correct to the nearest 0.1°)



40. Vivian walks along a path AB of length 41 m. If the vertical distance BC is 9 m and the horizontal distance AC is 40 m, find the gradient of the path AB .



41. Mary has interviewed 10 ladies. The following shows the number of times each of them goes to beauty shops in a year:

0, 6, 10, 12, 6, 3, 4, 9, 9, 15

Find the mean and median of the above data.

42. The following table shows the time for 50 teams of students to solve all the problems in a Mathematics competition.

Time (min)	8 – 10	11 – 13	14 – 16	17 – 19	20 – 22
Frequency	4	13	22	9	2

Find the modal class of the time for 50 teams of students to solve all the problems in the Mathematics competition.

SECTION C: All working must be clearly shown.
Write the mathematical expressions, answers and statements/conclusions in the spaces provided in the **ANSWER BOOKLET**.

43. The table below shows the number of newborn babies in Hong Kong from 2006 to 2010.

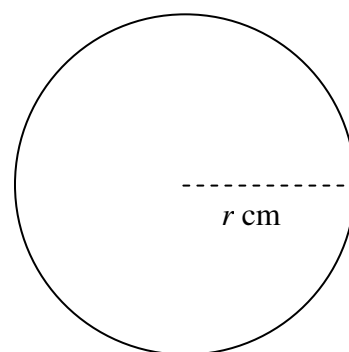
Year	2006	2007	2008	2009	2010
Number of newborn babies (ten thousand)	6.6	7.1	7.9	8.2	8.9

According to the above data, complete the broken line graph in the **ANSWER BOOKLET**.

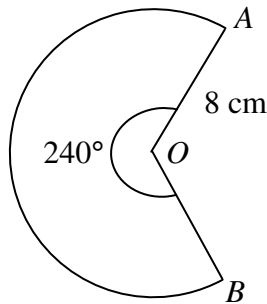
44. The marked price of a table is \$2 450. It is now sold at a discount of 20%. Find the selling price of the table.
45. The present value of a camera is \$8 000. The rate of depreciation is 25% each year. Find the value of the camera after three years.
46. Degree Fahrenheit ($^{\circ}F$) and degree Celsius ($^{\circ}C$) are two kinds of units for measuring temperature. The relation between F degree Fahrenheit and C degree Celsius can be represented by the following formula:

$$F = \frac{9C}{5} + 32$$

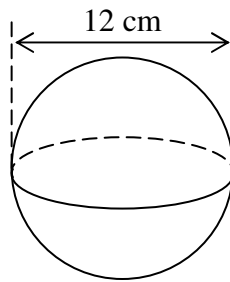
- (a) Make C the subject of the formula.
- (b) If $F = 104$, find the value of C .
47. The area of a circle is $25\pi \text{ cm}^2$.
- (a) Let the radius of the circle be $r \text{ cm}$. Find the value of r .
- (b) Find the circumference of the circle.
Express the answer in terms of π .



48. In the figure, the radius of sector OAB is 8 cm and reflex $\angle AOB = 240^\circ$. Find the length of \widehat{AB} . Correct the answer to the nearest 0.1 cm.



49. The figure shows a sphere of diameter 12 cm. Find the surface area of the sphere. Correct the answer to the nearest 0.1 cm^2 .



50. An organization has recorded the years of service of 20 employees. The result is shown below:

1	5	26	7	10
14	18	5	12	4
11	9	10	12	17
15	8	8	9	24

Use the data to complete the two frequency distribution tables in the **ANSWER BOOKLET**.

51. Susan and her brother went to school 5 days last week. Every day they went to school and came back home by bus on their own. Susan spent \$9.7 and her brother spent \$4.9 on bus fares each day.

Based on the description above, give an approximation for each of the **UNDERLINED VALUES** respectively. Use these 2 approximations to estimate their total bus fares for these 5 school days. Briefly explain your estimation method.

END OF PAPER

