

Name:

Date:

INSTRUCTIONS TO CANDIDATES**Section A (30 marks)****Time: 45 minutes**

1. Answer all the questions in this section.
2. Calculators may not be used in this section.
3. All working must be clearly shown. Omission of essential working will result in loss of marks.
4. The marks for each question is shown in brackets [] at the end of each question.

1 Evaluate each of the following, giving your answer as a fraction in the lowest terms.

(a) $\frac{1}{6} + \frac{3}{4}$

(b) $\left(3\frac{1}{3} - 1\frac{1}{2}\right) \div 2\frac{2}{3}$

Answer (a) [1]

(b) [1]

2 Calculate the exact values of

(a) $2.592 \div 1.2$,

(b) $1.6^2 + 1.6 \times 0.4$.

Answer (a) [1]

(b) [1]

- 3 (a) Express 0.0135 as a fraction in its lowest terms.
(b) Express $\frac{6}{7}$ as a decimal, giving your answer correct to 3 decimal places.
(c) Express $\frac{7}{22}$ as a recurring decimal.

Answer (a) [1]

(b) [1]

(c) [1]

-
- 4 (a) Simplify $\frac{36 + 12}{36 \times 12}$, expressing your answer as a fraction in its lowest terms.
(b) Find the decimal number which is exactly halfway between 0.57 and 0.73.

Answer (a) [1]

(b) [1]

5 Evaluate each of the following, giving your answer as a fraction in its lowest terms.

(a) $\sqrt{\frac{3}{4} \times \frac{6}{11}} \div 1\frac{3}{8}$

(b) $6\frac{7}{8} - \left(1\frac{3}{8} + 1\frac{3}{4} \times 3\frac{1}{2}\right) \div 1\frac{2}{3}$

Answer (a) [2]

(b) [2]

6 Given that $276 \times 63 = 17\,388$, find the exact values of

(a) 2.76×630 ,

(b) $173.88 \div 0.63$.

Answer (a) [1]

(b) [1]

- 7 (a) Draw a number line and use dots to represent that following numbers.

$$1\frac{4}{5}, 1.89, 1.95, 1\frac{3}{4}$$

- (b) Find the number of times $\frac{1}{3}$ is needed to make the mathematical statement below true.

$$\frac{1}{3} \div \frac{1}{3} \div \frac{1}{3} \div \dots \div \frac{1}{3} = 81$$

Answer (a)

[2]

Answer (b) [2]

-
- 8 (a) Calculate $\frac{(0.3)^2 \times 40}{(1.2)^2}$, expressing your answer as a fraction in its lowest terms.

- (b) The mass of a pail which was 0.8 filled with sand was 5.95 kg. If the mass of the empty pail was 1.15 kg, find the mass of the pail which is completely filled with sand.

Answer (a) [2]

(b) kg [2]

- 9 Mr Lim took his wife and children to an amusement park. Each adult ticket cost \$9.60 while each child ticket cost half as much. If Mr Lim paid \$43.20 altogether, how many children does he have?

Answer children [3]

- 10 A sum of money was divided among four boys. Tom received $\frac{1}{3}$ of the money and Jack received $\frac{1}{4}$ of the money. Peter received $\frac{1}{5}$ of the remainder while Bob received the rest. If Bob received \$200, how much was the original sum of money?

Answer \$ [4]

INSTRUCTIONS TO CANDIDATES

Section B (30 marks)

Time: 45 minutes

1. Answer all the questions in this section.
 2. Calculators may be used in this section.
 3. All working must be clearly shown. Omission of essential working will result in loss of marks.
 4. The marks for each question is shown in brackets [] at the end of each question.
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11 Use a calculator to evaluate each of the following, giving your answer correct to 2 decimal places.

(a) $7.713 + \frac{3\frac{1}{4} - 2\frac{1}{5}}{1\frac{1}{2} + 1\frac{2}{3}}$

(b) $27.2^2 + \sqrt{2895.95} + \sqrt[3]{316.9} \times 18.7^2$

(c) $\sqrt[3]{\frac{8.09^3 \times 16.755}{7.017} - \frac{29.99^2}{19.99}}$

Answer (a) [1]

(b) [1]

(c) [1]

12 (a) Arrange the following numbers in descending order.

$0.6\dot{7}$, $\frac{2}{3}$, 0.671 , $0.6\dot{7}$, 0.6^2

(b) Find, in its simplest form, the fraction that is greater than $\frac{5}{17}$ but less than $\frac{6}{17}$.

(c) Evaluate $\left(1 + \frac{1}{2}\right)\left(1 + \frac{1}{3}\right)\left(1 + \frac{1}{4}\right) \times \dots \times \left(1 + \frac{1}{101}\right)$.

Answer (a) [2]

(b) [1]

(c) [3]

- 13 (a) Linda bought 7 apples at \$0.25 each, $2\frac{3}{8}$ kg of chicken at \$6.40 per kg and 6.5 kg of prawns at \$8.90 per $\frac{1}{2}$ kg. How much did she spend altogether?
- (b) Mr Tan went to the toy shop. He spent $\frac{1}{6}$ of his money to buy 7 model racing cars which cost \$5.95 per car. He used the remainder of the money to buy 5 miniature trains at \$16.37 each and some action figures which were sold in packets of 3 figures at \$15.80 per packet.
- (i) How much money did Mr Tan bring to the toy shop?
- (ii) Find the number of action figures he bought.

Answer (a) \$ [2]

(b) (i) \$ [2]

(ii) action figures [3]

- 14 (a) Philip bought a box of paper clips. $\frac{1}{4}$ of them were silver and the rest of them were black. He gave away $\frac{1}{2}$ of the silver clips and $\frac{1}{3}$ of the black clips. He has 30 paper clips left. How many paper clips were there in the box?
- (b) Betty received a sum of money from her mother. She spent $\frac{1}{3}$ of it on a dress, $\frac{1}{5}$ of it on a pair of shoes and \$55 of it on a bag. If she still had \$29 left, how much money did she receive?

Answer (a) paper clips [3]

(b) \$ [3]

- c.
y
a
e
- 15 (a) $\frac{2}{5}$ of a container was filled with a chemical solution. After \$81.90 of the solution was added to the container, it became $\frac{5}{6}$ full. If the chemical solution cost \$15.75 per litre, find the capacity of the container.
- (b) Mabel bought a packet of flour. She used $\frac{1}{4}$ of the flour to bake some cookies and $\frac{1}{6}$ of the remainder to bake a cake. If she has used 525.6 g of flour so far, how much flour does she have left?
- (c) 1 kg of chocolates and 1 kg of candies cost \$56.50 altogether. John bought 2 kg of chocolates and 5 kg of candies for \$172.10. How much did 2 kg of chocolates cost?

Answer (a) l [2]

(b) g [3]

(c) \$ [3]

(d) No. of connectors needed to make Fig. 100
 $= 100^2 + 6(100) + 5$
 $= 10\,000 + 600 + 5$
 $= 10\,605$

Test 4: Fractions and Decimals

Section A

1. (a) $\frac{1}{6} + \frac{3}{4}$
 $= \frac{2+9}{12}$
 $= \frac{11}{12}$

The LCM of 6 and 4 is 12.

(b) $\left(3\frac{1}{3} - 1\frac{1}{2}\right) + 2\frac{2}{3}$
 $= \left(3\frac{2}{6} - 1\frac{3}{6}\right) + 2\frac{2}{3}$
 $= \left(2\frac{8}{6} - 1\frac{3}{6}\right) + 2\frac{2}{3}$
 $= 1\frac{5}{6} + 2\frac{2}{3}$
 $= \frac{11}{6} + \frac{8}{3}$
 $= \frac{11}{6} \times \frac{2^1}{2^1} + \frac{8}{3}$
 $= \frac{11}{6} + \frac{16}{6}$
 $= \frac{27}{6}$
 $= \frac{9}{2}$

Teacher's Tip

Calculate the expression within the brackets first.

Rename $3\frac{2}{6}$ as $2\frac{8}{6}$ since $\frac{2}{6} < \frac{3}{6}$.

2. (a) $\frac{2.592}{1.2} = \frac{2.592 \times 10}{1.2 \times 10}$
 $= \frac{25.92}{12}$
 $= 2.16$

$$\begin{array}{r} 2.16 \\ 12 \overline{) 25.92} \\ \underline{24} \\ 19 \\ \underline{12} \\ 72 \\ \underline{72} \\ 0 \end{array}$$

Teacher's Tip

- Make the divisor (1.2) into a whole number by multiplying both the divisor and dividend by 10.
- Perform long division, keeping the decimal point aligned.

(b) $1.6^2 + 1.6 \times 0.4$
 $= 1.6 [1.6 + 0.4]$
 $= 1.6 \times (2)$
 $= 3.2$

Teacher's Tip

Use the distributive law over addition.

$$a \times b + a \times c = a \times (b + c)$$

3. (a) $0.0135 = \frac{135}{10\,000} = \frac{27}{2000}$
 4 decimal places 4 zeros

(b) $\frac{6}{7} = 6 \div 7$
 ≈ 0.857
 (correct to 3 d.p.)

Extra digit
↓
is smaller
than 5.

$$\begin{array}{r} 0.8571 \\ 7 \overline{) 6.0000} \\ \underline{56} \\ 40 \\ \underline{35} \\ 50 \\ \underline{49} \\ 10 \\ \underline{7} \\ 3 \end{array}$$

Teacher's Tip

The division is carried out up to 4 d.p., 1 d.p. more than required.

(c) $\frac{7}{22} = 7 \div 22$
 ≈ 0.318

$$\begin{array}{r} 0.318181 \\ 22 \overline{) 7.000000} \\ \underline{66} \\ 40 \\ \underline{22} \\ 180 \\ \underline{176} \\ 40 \\ \underline{22} \\ 180 \\ \underline{176} \\ 40 \\ \underline{22} \\ 18 \end{array}$$

Teacher's Tip

A recurring decimal is a decimal that has a number of digits that repeat infinitely.

e.g. $0.3 = 0.3333\dots$
 $0.12 = 0.121212\dots$
 $0.456 = 0.456456456\dots$

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4. (a) $\frac{36 + 12}{36 \times 12}$ Add the numerator first.

$$= \frac{48}{36 \times 12}$$

$$= \frac{1}{9}$$

(b) $(0.57 + 0.73) \div 2$

$$= \frac{1.3}{2}$$

$$= 0.65$$

5. (a) $\sqrt{\frac{3}{4} \times \frac{6}{11} \div 1\frac{3}{8}}$

$$= \sqrt{\frac{3}{4} \times \frac{6}{11} \div \frac{11}{8}}$$

$$= \sqrt{\frac{3}{4} \times \frac{6}{11} \times \frac{8}{11}}$$

$$= \sqrt{\frac{36}{121}}$$

$$= \frac{6}{11}$$

Teacher's Tip

Express the mixed number as an improper fraction first. Then change \div to \times and invert the divisor.

(b) $6\frac{7}{8} - \left(1\frac{3}{8} + 1\frac{3}{4} \times 3\frac{1}{2}\right) \div 1\frac{2}{3}$

$$= 6\frac{7}{8} - \left(1\frac{3}{8} + \frac{7}{4} \times \frac{7}{2}\right) \div \frac{5}{3}$$

$$= 6\frac{7}{8} - \left(1\frac{3}{8} + 6\frac{1}{8}\right) \div \frac{5}{3}$$

$$= 6\frac{7}{8} - 7\frac{1}{2} \times \frac{3}{5}$$

$$= 6\frac{7}{8} - \frac{15^3}{2} \times \frac{3}{5}$$

$$= 6\frac{7}{8} - 4\frac{1}{2}$$

$$= 6\frac{7}{8} - 4\frac{4}{8}$$

$$= 2\frac{3}{8}$$

Teacher's Tip

Calculate the expression within brackets first. Start with multiplication. Do division next before subtraction.

6. $276 \times 63 = 17\,388$ (Given)

(a) 2.76×630

$$= \frac{276}{100} \times 63 \times 10$$

$$= \frac{276 \times 63}{10}$$

$$= \frac{17\,388}{10}$$

$$= 1738.8$$

Teacher's Tip

Express 2.76×630 in terms of 276×63 .

(b) $276 \times 63 = 17\,388$ (Given)

$$\frac{17\,388}{63} = 276$$

$$173.88 \div 0.63$$

$$= \frac{17\,388}{100} \div \frac{63}{100}$$

$$= \frac{17\,388}{100} \times \frac{100}{63}$$

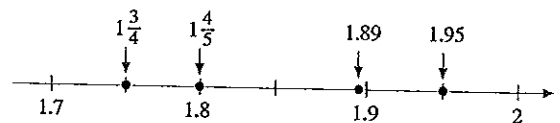
$$= \frac{17\,388}{63}$$

$$= 276$$

7. (a) $1\frac{4}{5}$, 1.89, 1.95, $1\frac{3}{4}$

Convert all fractions to decimals.

$$1\frac{4}{5} = 1.8 \quad 1\frac{3}{4} = 1.75$$



(b) $\frac{1}{3} + \frac{1}{3} \div \frac{1}{3} + \dots \div \frac{1}{3}$

$$= \frac{1}{3} \times \cancel{3} \times \underbrace{3 \times 3 \times 3 \times 3}_{81}$$

Change \div to \times by inverting the divisor.

$$= 81$$

\therefore it will need 6 times of $\frac{1}{3}$ to make the mathematical statement true.

$$\begin{aligned}
 8. \quad (a) \quad & \frac{(0.3)^2 \times 40}{(1.2)^2} \\
 &= \frac{0.3 \times 0.3 \times 40}{1.2 \times 1.2} \times \frac{100}{100} \\
 &= \frac{\overset{10^5}{\cancel{1}3} \times \overset{10^5}{\cancel{1}3} \times \overset{10^5}{\cancel{4}0}}{\overset{10^5}{\cancel{1}2} \times \overset{10^5}{\cancel{1}2}} \\
 &= \frac{5}{2} \\
 &= 2\frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 (b) \quad & \text{Mass of sand when pail is 0.8 full} \\
 &= 5.95 - 1.15 \\
 &= 4.8 \text{ kg} \\
 & \text{Mass of sand when pail is full} \\
 &= \frac{1}{0.8} \times 4.8 \\
 &= 6 \text{ kg} \\
 & \text{Mass of pail which is full} \\
 &= 6 + 1.15 \\
 &= 7.15 \text{ kg}
 \end{aligned}$$

$$\begin{aligned}
 9. \quad & \text{Cost of tickets for 2 adults} \\
 &= 2 \times \$9.60 \\
 &= \$19.20 \\
 & \text{Total cost of tickets for children} \\
 &= \$43.20 - \$19.20 \\
 &= \$24 \\
 & \text{Cost of ticket for each child} \\
 &= \$9.60 \div 2 \\
 &= \$4.80 \\
 & \text{No. of children} \\
 &= \frac{24}{4.80} \\
 &= \frac{240}{48} \\
 &= 5
 \end{aligned}$$

10. Fraction of money received by Tom and Jack

$$\begin{aligned}
 &= \frac{1}{3} + \frac{1}{4} \\
 &= \frac{4 + 3}{12} \\
 &= \frac{7}{12}
 \end{aligned}$$

Fraction of remaining money

$$\begin{aligned}
 &= 1 - \frac{7}{12} \\
 &= \frac{5}{12}
 \end{aligned}$$

Bob received $\left(1 - \frac{1}{5} = \frac{4}{5}\right)$ of the remaining money.

Fraction of money received by Bob

$$\begin{aligned}
 &= \frac{A^1}{B^1} \times \frac{B^1}{12^3} \\
 &= \frac{1}{3}
 \end{aligned}$$

$\therefore \frac{1}{3}$ of the sum = \$200

$$\begin{aligned}
 & \text{Original sum of money} \\
 &= 3 \times \$200 \\
 &= \$600
 \end{aligned}$$

Section B

$$11. \quad (a) \quad 7.713 + \frac{3\frac{1}{4} - 2\frac{1}{5}}{1\frac{1}{2} + 1\frac{2}{3}}$$

$$\begin{aligned}
 &= 8.044\dots \\
 &\approx 8.04 \text{ (correct to 2 d.p.)}
 \end{aligned}$$

$$\begin{aligned}
 (b) \quad & 27.2^2 \div \sqrt{2895.95} \div \sqrt[3]{316.9} \times 18.7^2 \\
 &= 705.155\dots \\
 &\approx 705.16 \text{ (correct to 2 d.p.)}
 \end{aligned}$$

$$\begin{aligned}
 (c) \quad & \sqrt[3]{\frac{8.09^3 \times 16.755}{7.017} - \frac{29.99^2}{19.99}} \\
 &= 10.683\dots \\
 &\approx 10.68 \text{ (correct to 2 d.p.)}
 \end{aligned}$$



Teacher's Tip

To round off a decimal:

1. Include one extra digit (on the right) for consideration.
2. Drop the extra digit if it is less than 5.
3. If it is 5 or more, add 1 to the previous digit before dropping the extra digit.

$$\begin{array}{ccccccc}
 12. \quad (a) & 0.\dot{6}7, & \frac{2}{3}, & 0.671, & 0.\dot{6}7, & 0.6^2 \\
 & \uparrow & \uparrow & & \uparrow & \uparrow \\
 & 0.6777\dots & 0.6666\dots & & 0.6767\dots & 0.36
 \end{array}$$

\therefore the numbers arranged in descending order are:

$$0.\dot{6}7, 0.\dot{6}7, 0.671, \frac{2}{3}, 0.6^2$$

(b) Fraction required

$$\begin{aligned}
 &= \left(\frac{5}{17} + \frac{6}{17}\right) \div 2 \\
 &= \frac{11}{34}
 \end{aligned}$$

(c)

**Teacher's Tip**
Look for a pattern.

$$\begin{aligned} & \left(1 + \frac{1}{2}\right)\left(1 + \frac{1}{3}\right)\left(1 + \frac{1}{4}\right) \times \dots \times \left(1 + \frac{1}{101}\right) \\ &= \frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \dots \times \frac{101}{100} \times \frac{102}{101} \\ &= \frac{102}{2} \\ &= 51 \end{aligned}$$

Cancel the numerators and denominators that are the same.

13. (a) Total amount spent

$$= (7 \times \$0.25) + \left(2\frac{3}{8} \times \$6.40\right) + (6.5 \times \$8.90 \times 2)$$

$$= \$132.65$$

(b) (i) Cost of 7 racing cars

$$= 7 \times \$5.95$$

$$= \$41.65$$

$$\frac{1}{6} \text{ of money} = \$41.65$$

$$\text{Total amount} = 6 \times \$41.65$$

$$= \$249.90$$

 \therefore Mr Tan brought \$249.90 to the toy shop.

(ii) Remainder of money

$$= \$249.90 - \$41.65$$

$$= \$208.25$$

Cost of 5 trains

$$= 5 \times \$16.37$$

$$= \$81.85$$

Cost of action figures

$$= \$208.25 - \$81.85$$

$$= \$126.40$$

No. of packets of action figures

$$= \frac{\$126.40}{\$15.80}$$

$$= 8$$

No. of action figures

$$= 3 \times 8 = 24$$

14. (a) Fraction of silver clips given away

$$= \frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$$

Fraction of black clips

$$= 1 - \frac{1}{4} = \frac{3}{4}$$

Fraction of black clips given away

$$= \frac{1}{3} \times \frac{3}{4} = \frac{1}{4}$$

Fraction of clips left

$$= 1 - \frac{1}{8} - \frac{1}{4}$$

$$= \frac{5}{8}$$

$$\frac{5}{8} \text{ of total clips} = 30$$

$$\frac{1}{8} \text{ of total clips} = \frac{30}{5} = 6$$

$$\therefore \text{total clips in box} = 8 \times 6$$

$$= 48$$

(b) $1 - \frac{1}{3} - \frac{1}{5} = \frac{7}{15}$

$$\therefore \frac{7}{15} \text{ of her money} = \$55 + \$29$$

$$= \$84$$

$$\frac{1}{15} \text{ of her money} = \frac{\$84}{7} = \$12$$

$$\therefore \text{amount of money received} = 15 \times \$12$$

$$= \$180$$

15. (a) Fraction of additional solution

$$= \frac{5}{6} - \frac{2}{5}$$

$$= \frac{13}{30}$$

No. of litres of additional solution

$$= \frac{\$81.90}{\$15.75}$$

$$= 5.2$$

$$\therefore \frac{13}{30} \text{ of container} = 5.2 \text{ l}$$

$$\frac{1}{30} \text{ of container} = 5.2 \div 13 = 0.4 \text{ l}$$

$$\text{Capacity of container} = 30 \times 0.4 = 12 \text{ l}$$

(b) Fraction of flour used to bake a cake

$$= \frac{1}{6} \times \left(1 - \frac{1}{4}\right)$$

$$= \frac{1}{6} \times \frac{3}{4}$$

$$= \frac{1}{8}$$

Fraction of flour used so far

$$= \frac{1}{4} + \frac{1}{8}$$

$$= \frac{3}{8}$$

Fraction of the flour left

$$= 1 - \frac{3}{8}$$

$$= \frac{5}{8}$$

$$\frac{3}{8} \text{ of flour} = 525.6 \text{ g}$$

$$\frac{1}{8} \text{ of flour} = 525.6 \div 3 = 175.2 \text{ g}$$

$$\frac{5}{8} \text{ of flour} = 5 \times 175.2 = 876 \text{ g}$$

- (c) 1 kg of chocolates
 + 1 kg of candies = \$56.50 (Given)
 2 kg of chocolates
 + 2 kg of candies = $2 \times \$56.50$
 = \$113
 2 kg of chocolates
 + 5 kg of candies = \$172.10 (Given)
 \therefore cost of 3 kg of candies
 = \$172.10 - \$113
 = \$59.10
 Cost of 1 kg of candies
 = $\frac{\$59.10}{3}$
 = \$19.70
 \therefore cost of 1 kg of chocolates
 = \$56.50 - \$19.70
 = \$36.80

Teacher's Tip

Find the total cost of 2 kg of chocolates and 2 kg of candies first.

Test 5: Real Numbers

Section A

1. (a) $-1.2 \times (-0.5)$
 = 1.2×0.5
 = 0.6
 (b) $69.6 \div (-0.04)$
 = $-(69.6 \div 0.04)$
 = $-\left(\frac{6960}{4}\right)$
 = -1740

Teacher's Tip

Rules for multiplying and dividing of directed numbers

Multiplication

- $(+) \times (+) = (+)$
 $(-) \times (-) = (+)$
 $(+) \times (-) = (-)$
 $(-) \times (+) = (-)$

Division

- $(+) \div (+) = (+)$
 $(-) \div (-) = (+)$
 $(+) \div (-) = (-)$
 $(-) \div (+) = (-)$

2. (a) $-8 - (11 - 21)$
 = $-8 - (-10)$
 = $-8 + 10$
 = 2
 (b) $\{-12 - [17 + (-8)]\} \div 3$
 = $\{-12 - 9\} \div 3$
 = $-21 \div 3$
 = -7

Teacher's Tips

Order of operations

- Simplify the expressions within the brackets first. (Start with innermost brackets.)
- Working from left to right, perform multiplication and division before addition and subtraction.

3. (a) $(-12) \times (-17) + 9 \times (-17)$
 = $[(-12) + 9] \times [-17]$

Teacher's Tip

Use the distributive law over addition.

$a \times b + a \times c = a \times (b + c)$

(b) $(-3)^3 + (-5)^2$
 = $-27 + 25$
 = -2
 $(-2)^2 \times \left(-\frac{1}{2}\right)$
 = $4 \times \left(-\frac{1}{2}\right)$
 = -2
 $\therefore (-3)^3 + (-5)^2 = (-2)^2 \times \left[-\frac{1}{2}\right]$

Within brackets, perform multiplication before subtraction.

4. (a) $[3 - (-12) \times (-4)] \div (-15)$
 = $[3 - 48] \div (-15)$
 = $(-45) \div (-15)$
 = $45 \div 15$
 = 3
 $[(-2) \times (-25)] \div (-10)$
 = $50 \div (-10)$
 = $-(50 \div 10)$
 = -5
 $\therefore [3 - (-12) \times (-4)] \div (-15) \boxed{>} [(-2) \times (-25)] \div (-10)$

(b) $\frac{6 \times (-5) + (-10)^2}{35 \div (-5)}$
 = $\frac{-30 + 100}{-7}$
 = $\frac{70}{-7}$
 = -10
 $\frac{(-2)^3 \times (-3)^2}{(-6) \times (-2)}$
 = $\frac{-8 \times 9}{12}$
 = $\frac{-72}{12}$
 = -6
 $\therefore \frac{6 \times (-5) + (-10)^2}{35 \div (-5)} \boxed{<} \frac{(-2)^3 \times (-3)^2}{(-6) \times (-2)}$