

B NUMBER (Number Concepts)	B1 use words and algebraic expressions to describe the data and the interrelationships in a table with rows that are not related recursively (not calculated from previous data)
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Knowledge

Prescribed Learning Outcomes – B1

Use the following table to answer question 1.

José purchased the 3 items listed in the table below.

Item	Price (\$)	GST (\$)	PST (\$)	Total (\$)
Shirt	24.82	1.75	1.99	28.69
Pants	29.73	2.09	2.39	34.36
Sweater	35.31	2.48	2.84	40.81

1. What is the rate of the PST?

- A. 7%
- B. 7.5%
- * C. 8%
- D. 8.5%

$$PST = \frac{1.99}{24.82} \times 100\%$$

$$= 8\% \text{ (only need to solve 1)}$$

Understanding

Prescribed Learning Outcomes – B1

2. What is the relationship between T and C in the following table?

T	0	1	2	3	4
C	2	3	6	11	18

- A. $T = C^2 - 2$
- B. $T = C - 2$
- C. $C = T + 2$
- * D. $C = T^2 + 2$

3. Individual standings for the current table tennis season are shown in the chart below. Each of the 8 players must still play one game with each of the other players.

Player	A	B	C	D	E	F	G	H
Games Won	46	45	41	39	38	27	23	21
Games Lost	24	25	29	31	32	43	47	49

How many players still have a theoretical chance to at least tie for the championship?

- A. 2
- B. 3
- C. 4
- D. 5

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B NUMBER (Number Concepts)	B2 use words and algebraic expressions to describe the data and the interrelationships in a table with rows that are related recursively (calculated from previous data)
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Knowledge

Prescribed Learning Outcomes – B2

Use the following information to answer questions 4 to 6.

The following table provides data on the growth of \$1000 invested at 3.05% per annum compounded annually.

Year	Opening Balance	Interest Rate	Interest Earned	Closing Balance
1	\$1000.00	3.05%	\$30.50	\$1030.50
2	\$1030.50	3.05%	\$31.43	\$1061.93
3	\$1061.93	3.05%	\$32.39	\$1094.32

Match each Term on the left with the correct Description on the right.
Each Description may be used once, more than once or not at all.

Term	Description
4. Interest Rate	A. opening balance + interest earned
5. Interest Earned	B. annual payment
6. Closing Balance	C. percent growth
	D. opening balance \times interest earned
	E. opening balance \times interest rate
	F. average balance

Answers

- 4. C
- 5. E
- 6. A

Use the following table to answer questions 7 to 10.
(Assume the pattern in the table continues.)

	Column			
Row	A	B	C	D
1	3	6	9	12
2	15	18	21	24
3	27	30	33	36
4	39	42	45	48
⋮	⋮	⋮	⋮	⋮

Understanding

Prescribed Learning Outcomes – B2; A5, A7

7. The numbers in row 10 are 111, 114, 117, 120.

- * A. True
 B. False

$$t_{10(A)} = 3 + (9)(12) = 111 \quad t_{10(C)} = 9 + 9(12) = 117$$

$$t_{10(B)} = 6 + 9(12) = 114 \quad t_{10(D)} = 12 + 9(12) = 120$$

8. Which of the following represents the numbers in row 50?

- * A. 591, 594, 597, 600
 B. 597, 600, 603, 606
 C. 600, 603, 606, 609
 D. 603, 606, 609, 612

$$t_{50(A)} = 3 + (49)(12) = 591$$

[Only need to solve once]

Higher Mental Processes

Prescribed Learning Outcomes – B2; A5, A7

9. The entry in Row n , Column A is $12n + 3$.

- * A. True
 B. False

general term

$$t_n = 3 + (n-1)12 \quad \therefore t_n = \underline{\underline{12n - 9}}$$

$$t_n = 3 + 12n - 12$$

10. Which of the following numbers will occur in Column C?

- * A. 147
 B. 240
 C. 249
 D. 303

$$147 = 9 + (n-1)12 \quad 240 = -3 + 12n$$

$$147 = 9 + 12n - 12 \quad 20.25 = n$$

$$147 = -3 + 12n \quad 249 = -3 + 12n$$

$$12.5 = n \quad 252 = 12n$$

B NUMBER (Number Operations)	B9 explain and apply the exponent laws for powers of numbers and for variables with rational exponents
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Knowledge

Prescribed Learning Outcomes – B9

37. What is the equivalent expression for $\frac{1}{\sqrt[5]{x^2}}$?

- * A. $x^{-\frac{2}{5}}$
 B. $-x^{\frac{2}{5}}$
 C. $x^{\frac{5}{2}}$
 D. $\left(\frac{1}{x^2}\right)^5$

$$= \frac{1}{x^{2/5}}$$

$$= x^{-2/5}$$

Understanding

Prescribed Learning Outcomes – B9

38. Simplify: $x^{\frac{3}{4}} \cdot x^{\frac{1}{4}} + x$

- A. $x^{\frac{9}{4}}$
 B. x^2
 C. $x^{\frac{5}{4}}$
 D. $2x$

$$= x^{4/4} + x$$

$$= x + x$$

$$= 2x$$

Match each Expression on the left with the Equivalent Expression on the right.
Each Equivalent Expression may be used once, more than once or not at all.

Expression	Equivalent Expression
C 39. $\left(\frac{b}{a}\right)^{\frac{3}{2}} = \sqrt[2]{\frac{b^3}{a^3}} \text{ or } \left(\sqrt{\frac{b}{a}}\right)^3$	A. $\sqrt[3]{\frac{b^2}{a^2}}$
A 40. $\left(\frac{a}{b}\right)^{-\frac{2}{3}} = \left(\frac{b}{a}\right)^{\frac{2}{3}} = \sqrt[3]{\frac{b^2}{a^2}}$	B. $-\left(\frac{b}{a}\right)^{\frac{3}{2}}$
C 41. $\left(\frac{a}{b}\right)^{-\frac{3}{2}} = \left(\frac{b}{a}\right)^{\frac{3}{2}} = \sqrt{\frac{b^3}{a^3}}$	C. $\sqrt{\frac{b^3}{a^3}}$ D. $-\left(\frac{a}{b}\right)^{\frac{2}{3}}$ E. $\sqrt[3]{\frac{a^2}{b^2}}$ F. $-\left(\frac{a}{b}\right)^{\frac{3}{2}}$

Answers

39. C
40. A
41. C

C PATTERNS AND RELATIONS (Patterns)	C1 generate number patterns exhibiting arithmetic growth
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Knowledge

Prescribed Learning Outcomes – C1; A5

42. Which of the following represents an arithmetic sequence?

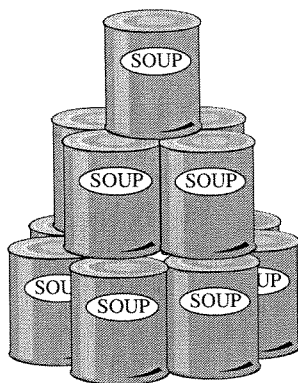
- A. 1, 1, 2, 3, 5, ...
- B. 1, 4, 9, 16, 25, ...
- * C. 2, 10, 18, 26, 34, ...
- D. 3, 9, 27, 81, 243, ...

Find a "common difference", if any.

Understanding

Prescribed Learning Outcomes – C1; A4, A5

43. Henry has set up in his grocery store a display of soup cans as shown in the diagram below. The top row (Row 1) has 1 soup can and each successive row has 3 more cans than the previous row.



a = 1
d = 3
r = ?
t_n = ?

Which of the following is an expression for the number of cans in Row n ?

- A. $3(n+1)$
- B. $3(n-1)$
- C. $3(n+1)-1$
- * D. $3(n-1)+1$

$\therefore t_n = 1 + (n-1)3$
or
 $t_n = 3(n-1) + 1$
or
 $t_n = 3n - 2$ } *general term (t_n)*

Use the following information to answer question 44.

A local library has stacked new books for processing before they are put on shelves. They are arranged on shelves such that there are 15 books on the third shelf and 57 books on the tenth shelf. The number of books on each successive shelf is represented by an arithmetic sequence.

Higher Mental Processes

Prescribed Learning Outcomes – C1; A4

44. How many books in total are on the first two shelves?

Answer

12

$$\underline{3}, \overset{\curvearrowleft}{9}, \overset{\curvearrowleft}{15}, _, _, _, _, _, _, \underline{57}$$

$$15 + 7d = 57$$

$$7d = 42$$

$$\underline{\underline{d = 6}}$$

$$\therefore 3 + 9$$

$$= \underline{\underline{12}}$$

C PATTERNS AND RELATIONS (Patterns)	C2 use expressions to represent general terms and sums for arithmetic growth, and apply these expressions to solve problems
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Knowledge

Prescribed Learning Outcomes – C2; A5

Use the following formula to answer questions 45 to 48.

$$t_n = a + (n - 1)d$$

Match each Term on the left with the correct Description on the right. Each Description may be used once, more than once, more than once or not at all.	
Term	Description
45. t_n	A. Common ratio B. Sum of n terms C. Value of the first term D. Common difference E. Value of the n^{th} term F. Number of terms G. Sum of first $n - 1$ terms
46. d	
47. a	
48. n	

Answers

- 45. E
- 46. D
- 47. C
- 48. F

Use the following information to answer question 49.

A local library has stacked new books for processing before they are put on shelves. They are arranged on shelves such that there are 15 books on the third shelf and 57 books on the tenth shelf. The number of books on each successive shelf is represented by an arithmetic sequence.

Understanding

Prescribed Learning Outcomes – C2; A4

49. If there are only 10 shelves of books, what is the total number of books that need to be processed?

- * A. 57
 B. 300
 C. 360
 D. 570

From question 44, $d=6$ & $a=3$, $t_{10}=57$

$$\therefore S_{10} = \frac{10}{2}(3+57)$$

$$S_{10} = 5(60) = \underline{\underline{300}}$$

Understanding

Prescribed Learning Outcomes – C2; A4

50. Pat's current annual salary is \$32 500. At the end of every year, Pat gets a raise of \$500. At the end of how many years will Pat's annual salary be \$40 000?

Answer

15

$$\frac{40000 - 32500}{500} = \underline{\underline{15 \text{ years}}}$$

Higher Mental Processes

Prescribed Learning Outcomes – C2; A4

51. Find the sum of the arithmetic series $(-100) + (-97) + (-94) + \dots + 107$

Answer

245

① Find "n"

$$107 = -100 + (n-1)3$$

$$107 = -100 + 3n - 3$$

$$210 = 3n$$

$$\underline{\underline{70 = n}}$$

② Find "S₇₀"

$$S_{70} = \frac{70}{2}(-100 + 107)$$

$$\underline{\underline{S_{70} = 245}}$$

Use the following information to answer questions 54 to 56.

multiplication

In the geometric sequence below, there are three missing positive integers between 9 and 144.

9, X, Y, Z, 144

$\xrightarrow{\times r}$ $\xrightarrow{\times r}$ $\xrightarrow{\times r}$ $\xrightarrow{\times r}$

54. What is the value of **X**?

Answer

18

$$9r^4 = 144$$

$$r^4 = 16$$

$$\sqrt[4]{r^4} = \sqrt[4]{16}$$

55. What is the value of **Y**?

Answer

36

$$r = 2$$

56. What is the value of **Z**?

Answer

72