

<b>C PATTERNS AND RELATIONS</b> <i>(Variables and Equations)</i>	<b>C5</b> factor polynomial expressions of the form $ax^2 + bx + c$ and $a^2x^2 - b^2x^2$
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Knowledge

Prescribed Learning Outcomes – C5

57.  $4x^2 + 25y^2$  is always factorable.

- A. True  
 \* B. False

*\* This expression does not have a GCF & is not a difference of squares.\**

Understanding

Prescribed Learning Outcomes – C5

Match each Product on the left with one of its Factors on the right. Each Factor may be used once, more than once or not at all.	
Product	Factor
58. $4x^2 - 1 = (2x+1)(2x-1)$	A. $x - 2$
59. $x^2 - 4x + 4 = (x-2)(x-2)$	B. $x + 2$
60. $4x^2 - 4x + 1 = (2x-1)(2x-1)$	C. $x - 4$ D. $x + 4$ E. $2x - 1$

Answers

58. E  
 59. A  
 60. E

61. What are the possible integral values of  $k$  so that  $2x^2 + kx - 1$  can be factored?

- A. -1, 2
- B. -2, 2
- C. -2, 1
- \* D. -1, 1

$$\begin{array}{r|l} 2x+1 & x \\ \hline x-1 & -2x \\ \hline & -3x \end{array}$$

$$\begin{array}{r|l} 2x-1 & -x \\ \hline x+1 & 2x \\ \hline & x \end{array}$$

←  $k$  values →

<p>C PATTERNS AND RELATIONS (Variables and Equations)</p>	<p>C6 find the product of polynomials  <i>Clarification: Multiplying polynomials include multiplying:</i>  – a monomial by a polynomial  – a binomial by a binomial  – a binomial by a trinomial  – squaring a binomial  – cubing a binomial</p>
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Knowledge

Prescribed Learning Outcomes – C6

62. When completely simplified, how many terms does the product of  $(2x + 5)(2x - 5)$  have?

- \* A. 1  
B. 2  
C. 3  
D. 4

*D.O.S results  
∴ only 2 terms*

$$= 4x^2 - \cancel{10x} + \cancel{10x} - 25$$

$$= 4x^2 - 25$$

Match each Expression on the left with the correct Expanded Form on the right. Each Expanded Form may be used once, more than once or not at all.	
Expression	Expanded Form
63. $(x+4)(x-4) = x^2 - 16$	A. $x^2 + 8x + 16$
64. $(x-4)^3$	B. $x^3 + 12x^2 + 48x + 64$
65. $(x+6)(x^2 - 2x + 4)$ $= x^3 - 2x^2 + 4x + 6x^2 - 12x + 24$ $= x^3 + 4x^2 - 8x + 24$	C. $x^3 - 64$
	D. $x^3 - 12x^2 + 48x - 64$
	E. $x^3 + 4x^2 - 8x + 24$
	F. $x^2 - 16$
	G. $x^2 - 8x + 16$

Answers

64.  $(x-4)(x-4)(x-4)$

$= (x^2 - 8x + 16)(x-4)$

63. F

64. D

65. E

$= x^3 - 4x^2 - 8x^2 - 32x + 16x - 64$

$= x^3 - 12x^2 - 16x - 64$

Higher Mental Processes

Prescribed Learning Outcomes – C6

66. If the product of  $(2x+1)(x^2+kx-4) = 2x^3 - 5x^2 - 11x - 4$ , what is the value of  $k$ ?

\* A. -3

B. -2

C. 2

D. 3

$$\begin{array}{r} 2x^3 + 2kx^2 - 8x \\ x^2 + kx - 4 \\ \hline 2x^3 - 5x^2 - 11x - 4 \end{array}$$

①  $2k + 1 = -5$     ②  $-8 + k = -11$

$2k = -6$  OR

$k = -3$

$k = -3$

<p>C PATTERNS AND RELATIONS (Variables and Equations)</p>	<p>C7 divide a polynomial by a binomial and express the result in the forms:</p> <ul style="list-style-type: none"> <li>- <math>\frac{P}{D} = Q + \frac{R}{D}</math></li> <li>- <math>P = DQ + R</math></li> <li>- <math>P(x) = D(x)Q(x) + R</math></li> </ul>
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Knowledge

Prescribed Learning Outcomes – C7

67.  $x^3 - x^2 + 3x - 4 = (x-2)(x^2 - 2x - 3) - 13$   
 $\therefore \frac{x^3 - x^2 + 3x - 4}{x-2} = (x^2 - 2x - 3) - 13, x \neq 2$

*This step must happen before the division by (x-2).*

- A. True
- \* B. False

Understanding

Prescribed Learning Outcomes – C7

68. Determine the remainder in the following division.

$\frac{3x^2 - 5x + 2}{x+2}; x \neq -2$

$$\begin{array}{r}
 3x - 11 \\
 x+2 \overline{) 3x^2 - 5x + 2} \\
 \underline{-(3x^2 + 6x)} \phantom{+ 2} \\
 -11x + 2 \\
 \underline{-(-11x - 22)} \\
 24
 \end{array}$$

Answer

24

Higher Mental Processes

Prescribed Learning Outcomes – C7; A2

69. If the area of a triangle is  $x^3 + x^2 - 4x - 4$  and the height is  $2x + 2$ , find the base in terms of  $x$ .

- \* A.  $x^2 - 4$
- B.  $2x^2 - 8$
- C.  $\frac{x^2 - 4}{2}$
- D.  $x^2 - 2$

$$\begin{array}{r}
 x^2 - 4 \\
 2x+2 \overline{) 2x^3 + 2x^2 - 8x - 8} \\
 \underline{-(2x^3 + 2x^2)} \phantom{- 8x - 8} \\
 -8x - 8 \\
 \underline{-(-8x - 8)} \\
 0
 \end{array}$$

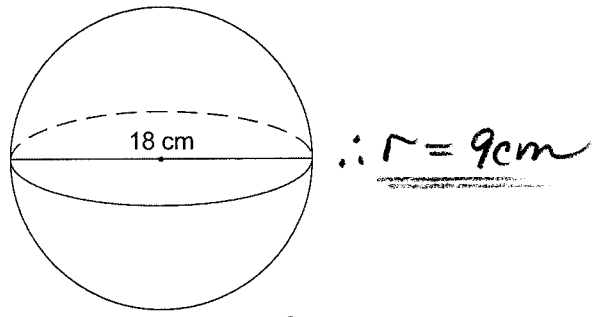
$$\begin{array}{l}
 A = \frac{bh}{2} \\
 2A = bh \\
 \frac{2A}{h} = b
 \end{array}$$

D SHAPE AND SPACE (Measurement)	D1 calculate the volume and surface area of a sphere, using formulae that are provided
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Knowledge

Prescribed Learning Outcomes – D1

122. What is the volume of the sphere below?



$$V = \frac{4\pi(9)^3}{3}$$

$$V = \underline{\underline{972\pi}}$$

- A.  $324\pi \text{ cm}^3$
- \* B.  $972\pi \text{ cm}^3$
- C.  $1296\pi \text{ cm}^3$
- D.  $7776\pi \text{ cm}^3$

Understanding

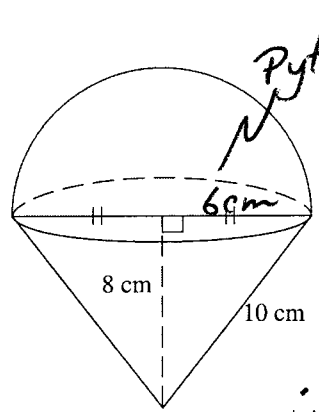
Prescribed Learning Outcomes – D1

123. Calculate the surface area, in square centimetres, of the figure below. Assume the rounded top is a hemisphere. Answer to two decimal places.

$$S.A.(\text{sphere}) = \frac{4\pi r^2}{2}$$

$$= 2\pi(6)^2$$

$$= 72\pi$$



$$S.A.(\text{cone}) = \pi r s \text{ [w/out } \pi r^2 \text{]}$$

$$= \pi(6)(10)$$

$$= 60\pi$$

$$\therefore T.S.A. = \underline{\underline{132\pi \text{ or } 414.69}}$$

Answer

414.69

124. What is the surface area of the largest sphere that will fit inside a cube of volume  $343\,000\text{ cm}^3$ ?

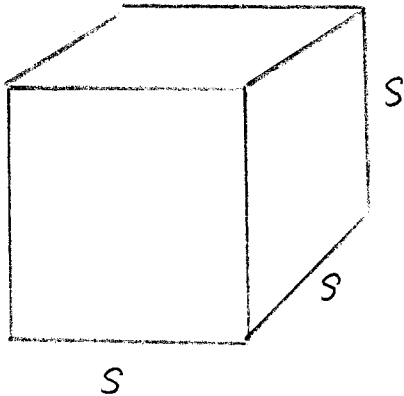
- \* A.  $15\,394\text{ cm}^2$   
 B.  $29\,400\text{ cm}^2$   
 C.  $61\,575\text{ cm}^2$   
 D.  $179\,594\text{ cm}^2$

$$S^3 = 343\,000\text{ cm}^3$$

$$S = \sqrt[3]{343\,000\text{ cm}^3}$$

$$S = 70\text{ cm} \text{ [also the diameter of the sphere]}$$

$$\therefore \text{radius} = \underline{35\text{ cm}}$$



$$\therefore \text{S.A.} = 4\pi(35\text{ cm})^2$$

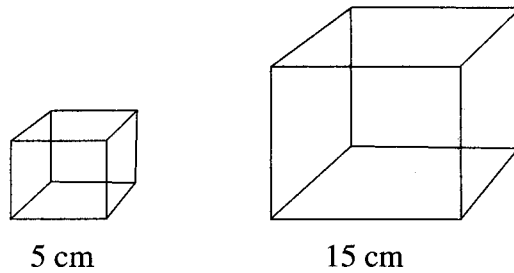
$$\text{S.A.} = \underline{15\,393.80\text{ cm}^2} \text{ [Maximum]}$$

<b>D SHAPE AND SPACE</b> <i>(Measurement)</i>	<b>D2</b> determine the relationships among linear scale factors, areas, the surface areas and the volumes of similar figures and objects
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Knowledge

Prescribed Learning Outcomes – D2

Use the following diagrams to answer question 125.



125. What is the ratio of the volume of the larger cube to the volume of the smaller cube?

- A. 3 : 1
- B. 9 : 1
- \* C. 27 : 1
- D. 15 : 5

$15 : 5$   
 $3 : 1 \rightarrow$  Sides ratio  
 $3^3 : 1^3 \rightarrow$  Volume ratio  
 $27 : 1$

Understanding

Prescribed Learning Outcomes – D2

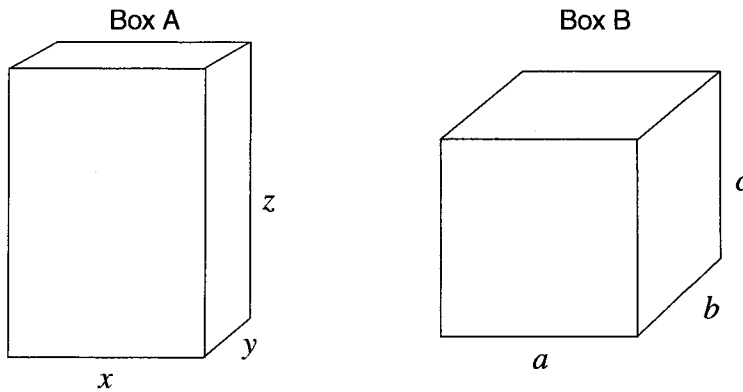
126. The area of a rectangle is  $200 \text{ cm}^2$ . By what factor must its length and width be multiplied to produce a similar rectangle with an area of  $400 \text{ cm}^2$ ?

- A.  $\frac{1}{2}$
- \* B.  $\sqrt{2}$
- C. 2
- D. 4

$400 : 200$   
 $2 : 1 \rightarrow$  Area ratio  
 $\sqrt{2} : \sqrt{1} \rightarrow$  Side ratio  
 $\sqrt{2} : 1$

Use the following diagrams to answer question 127.

The two containers each have a volume of 1 L.



127. Which of the following statements is correct?

- A. The surface areas of both boxes are equal.
- B. The surface area of Box A is less than the surface area of Box B.
- C. The surface area of Box A is greater than the surface area of Box B.
- \* D. The relationship cannot be determined by the information given.