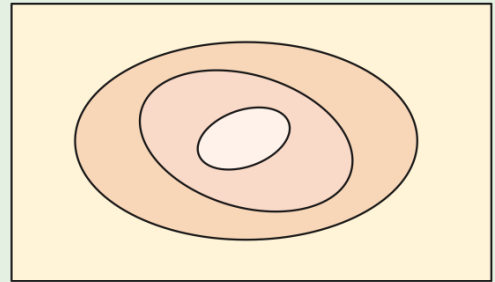


1.

Illustrate these numbers on a Venn diagram like the one shown:

$-1, \sqrt{2}, 2, 3.1, \pi, 4.\bar{2}$



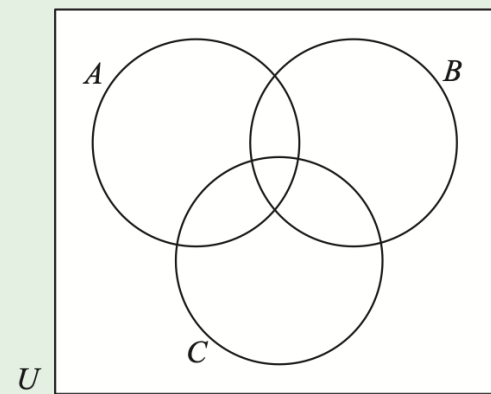
2.

If A is the set of all factors of 24 and B is the set of all factors of 18, find:

a $A \cap B$

b $A \cup B$

3.



Using separate Venn diagrams like the one shown, shade regions to verify that $(A \cap B) \cup C = (A \cup C) \cap (B \cup C)$.

4. From these 3 questions rate your understanding of sets and number sets from 1 to 5:

I know this very well

5

4

3

2

1

I struggled to find the right answers

5. Expand and simplify:

Case I: $3x(x - 2)$

Case II: $-(x - 2)^2$

Case III: $(x + 3)(x - 8)$

Case IV: $(4x + 1)(4x - 1)$

Case V: $(4x + 1)(3x - 2)$

6. Fully Factorize:

Case I: $3x^2 - 12x$

Case II: $x^2 - 6x + 9$

Case III: $2x^2 - 98$

Case IV: $3x + 7 + 6bx + 14b$

Case V: $x^2 + 10x + 21$

Case VI: $12x^2 - 7x - 10$

7.

a Show that $(n + \frac{1}{2})^2 = n(n + 1) + \frac{1}{4}$.

b Use **a** to find: **i** $(3\frac{1}{2})^2$ **ii** $(10\frac{1}{2})^2$.

c Write a short paragraph which explains how to square numbers like those in **b i** and **ii** mentally.

8. From questions 5 ~ 7 rate your understanding of factorization from 1 to 5:

I know this very well

5 4 3 2 1

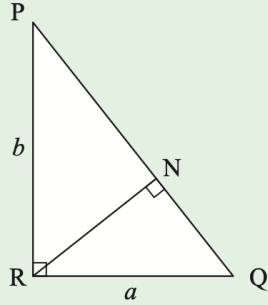
I struggled to find the right answers

9.

Write in the form $a + b\sqrt{5}$ where $a, b \in \mathbb{Q}$:

$$\frac{3 - \sqrt{5}}{3 + \sqrt{5}} - \frac{4}{3 - \sqrt{5}}$$

10.



i What is the length of [PQ]?

ii Explain using triangle areas why

$$RN = \frac{ab}{\sqrt{a^2 + b^2}}.$$

11.

Given $A(-3, 2)$, $B(2, 3)$, $C(4, -1)$ and $D(-1, -2)$ are the vertices of quadrilateral ABCD:

- Find the gradient of [AB] and [DC].
- Find the gradient of [AD] and [BC].
- What do you deduce from your answers to **a** and **b**?
- Find the midpoints of the diagonals of the quadrilateral. What property of parallelograms does this check?

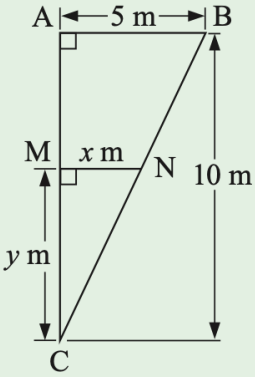
12.

- How far is $A(-1, -2, 5)$ from the origin O?
- $P(x, y, z)$ is equidistant from $(-1, 1, 0)$ and $(2, 0, 0)$.
Deduce that $y = 3x - 1$.

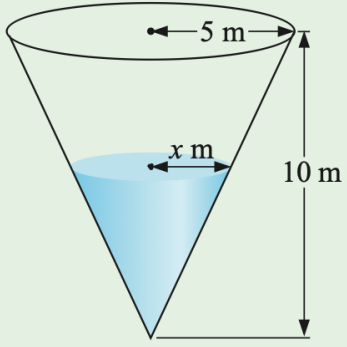
13. From questions 9 ~ 12 rate your understanding of the use of radicals and objects in the cartesian plane from 1 to 5:

I know this very well **5** **4** **3** **2** **1** *I struggled to find the right answers*

14.



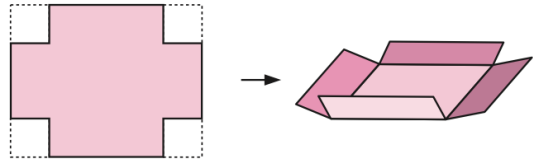
- Show that Δ s ABC and MNC are similar.
- Hence, show that $y = 2x$.
- The volume of a cone is given by $V = \frac{1}{3}\pi r^2 h$.
Find the volume of water in the cone in terms of x .



15.

A sheet of cardboard is 15 cm long and 10 cm wide. It is to be made into an open box which has a base area of 66 cm^2 , by cutting out equal squares from the four corners and then bending the edges upwards.

Find the size of the squares to be cut out.



16.

Two long straight roads intersect at P at an angle of 53° . Starting at P, cyclist A rides for 16.2 km along one of the roads, while cyclist B rides 18.9 km along the other road. How far apart are the cyclists now? Assume \widehat{APB} is acute.

17. From questions 14 ~ 16 rate your understanding of general problem solving (or their corresponding areas) from 1 to 5:

I know this very well

5 4 3 2 1

I struggled to find the right answers

18. Reflect: which areas of Mathematics do you feel you need to review? What can you do to improve in these areas? What do you need to improve in these areas? What commitments are you willing to make to improve in these areas? What will be the actions you will take to improve in this areas and when will be your deadlines to achieve this? How will you measure your success? Please share your answers to questions 4, 8, 13, 17, and 18 in the [google classroom](#).