UNIT 1 REVIEW - ANSWERS

Math 8D

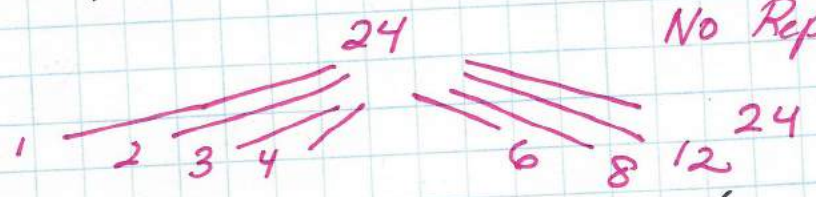
① IS 24 A PERFECT SQUARE?

- WE KNOW BY WRITING OUR PERFECT SQUARE LIST, THAT 24 IS NOT A PERFECT SQUARE

$1 \times 1 = 1$ $\quad 3 \times 3 = 9$ $\quad 5 \times 5 = 25$

$2 \times 2 = 4$ $\quad 4 \times 4 = 16$

- ALSO, WHEN WE WRITE DOWN THE FACTORS OF 24, WE SEE THAT THERE IS NO FACTOR THAT REPEATS TWICE. THEREFORE, 24 IS NOT A PERFECT SQUARE

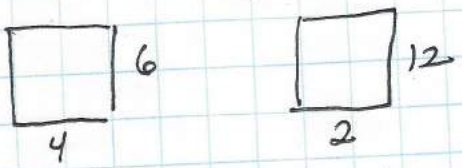


No Repeating factor

- THE AREA OF A SQUARE WILL HAVE, AS A BASE OR AS HEIGHT, THE FACTORS ABOVE.

BUT

THE BASE AND THE HEIGHT ARE NOT EQUAL. THUS, 24 IS NOT A SQUARE NUMBER



etc.

② WHICH OF THESE NUMBERS IS A PERFECT SQUARE?

a) 18

FACTORS: 1 - 18
2 - 9
3 - 6

No Repeating factor, thus 18 IS NOT a SQUARE NUMBER

b) 25

FACTORS:
1 - 25
5 - 5

Repeating factors

25 IS A PERFECT SQUARE

c) 44

FACTORS:
1 - 44
2 - 22
4 - 11

No Repeating Factor

44 IS NOT a PERFECT SQUARE

d) 80

FACTORS?
1 - 80
2 - 40
4 - 20
5 - 16
8 - 10

No Repeating Factor?

80 IS NOT A P.S.

③ I am A square number
the sum of my digits is 7.
What square number might I be?

- Make your "Perfect Square" list:

$1 \times 1 = 1$
$2 \times 2 = 4$
$3 \times 3 = 9$
$4 \times 4 = 16$
$5 \times 5 = 25$
$6 \times 6 = 36$
$7 \times 7 = 49$
$8 \times 8 = 64$
$9 \times 9 = 81$
$10 \times 10 = 100$

- look at: - 16 → 1 + 6 = 7
  - 25 → 2 + 5 = 7
- It turns out, out of all the ones you know, only 16 or 25 can be the answer.
- So that you know, other perfect squares are: 1024, 1600, 2401, 2500
  (the sum all all digits is 7)

④ Find the square of each number

a) 5 → Square means 5×5 or $5^2 = 25$

b) 7 → Square means 7×7 or $7^2 = 49$

c) 9 → $9^2 = 9 \times 9 = 81$

d) 13 → $13^2 = 13 \times 13 = 169$

⑤ Find a square root

Remember: A square root of a number is the number which multiplied by itself gives you that number

$7^2 = \sqrt{7 \times 7} = \sqrt{49} = 7$

$\sqrt{400} = \sqrt{20 \times 20} = 20$

$289 = \sqrt{289} = \sqrt{17 \times 17} = 17$

6) List the factors of each number in ascending order:

i) 108 = 1, 2, 3, 4, 6, 9, 12, 18, 27, 36, 54, 108

ii) 361 = 1, 19, 19, 361

19 Repeats. 361 is a Perfect Square

iii) 150 = 1, 2, 3, 5, 6, 10, 15, 25, 30, 50, 75, 150

iv) 286 = 1, 2, 11, 13, 22, 26, 143, 286

v) 324 = 1, 2, 3, 4, 6, 9, 12, 18, 18, 27, 36, 54, 81, 108, 162, 324

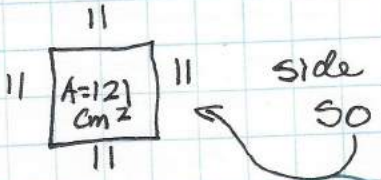
18 Repeats. Therefore 324 is a Perfect Square

vi) 56 = 1, 2, 4, 7, 8, 14, 28, 56

7) The area of a square is 121 cm^2. What is the perimeter of the square

Remember: Side length = $\sqrt{\text{AREA}}$

Perimeter = Sum of all sides



side length = $\sqrt{121}$ = 11 cm

so

Perimeter = (11 + 11 + 11 + 11) cm = 44 cm

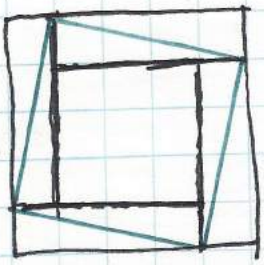
8. Find the Area:

Use the method you are most comfortable with

Remember

Area of square = $b \times h$

Area of triangle = $\frac{b \times h}{2}$



Method 1 =

- Draw lines towards the middle from each corner
  - Make: 4 square in the center, 4 equal triangles (Look above)

Total Area = Area of middle square
+
Area of 4 triangles

= Area of Square = $\overset{b \times h}{(3 \times 3)} = 9$

Area of Rectangle = $\frac{b \times h}{2} = \frac{4 \times 1}{2} = 2 \times 4 = 8$ (4 equal Rectangles)

$= 9 + 8 = 17$ units^2

Method 2 =

- Draw a square to encase your tilted square (See above)

total area = Area of outside square
−
Area of 4 outside Rectangles

Area of outside square = $5 \times 5 = 25$

Area of outside Rectangles = $\left(\frac{b \times h}{2}\right) \times 4 = \left(\frac{4 \times 1}{2}\right) \times 4 = 2 \times 4 = 8$

So total Area = (25 units^2 − 8 units^2) = 17 units^2

a)

$\sqrt{46}$

Perfect square before: $\sqrt{36}$ → 6

Perfect square after: $\sqrt{49}$ → 7

The square root of 46 is between 6 and 7

$\sqrt{84}$

Perfect square before: $\sqrt{81}$ → 9

Perfect square after: $\sqrt{100}$ → 10

The square root is between 9 and 10

$\sqrt{120}$

$\sqrt{100}$ → 10

$\sqrt{121}$ → 11

Square root is between 10 and 11

$\sqrt{1200}$

$\sqrt{1156}$ → 34

$\sqrt{1225}$ → 35

Square root is between 34 and 35

(9) The area of each square is given. Find its side length.

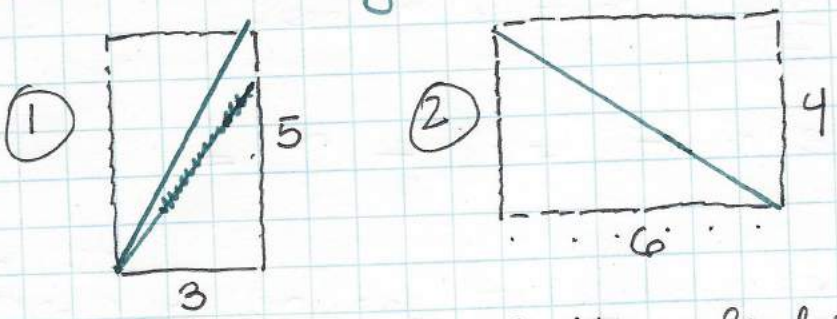
a) $A = 75\ cm^2$ side length $= \sqrt{75} = 8.66$ cm

b) $A = 96\ cm^2$ side length $= \sqrt{96} = 9.79$ cm

c) $A = 81\ cm^2$ side length $= \sqrt{81} = 9$ cm

The side length of this square is a whole number because 81 is a perfect square

(10) Without measuring: which line is longer



- Draw a square around it, calculate the area
  - Look at the base, height units
- Area of line 1 $= 3 \times 5 = 15$
  Area of line 2 $= 6 \times 4 = 24$

Thus line 2 is longer

(11) Very much like exercise 5, so we'll skip it!

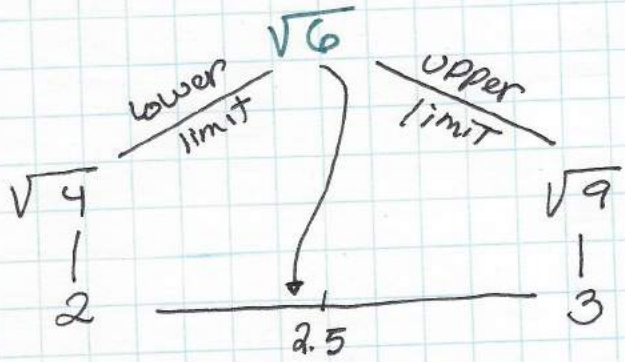
(12) Between which 2 consecutive <u>whole numbers</u> is each square root?

→

(13) Estimate each square root to the nearest whole number

- Proceed exactly how we answered the last question

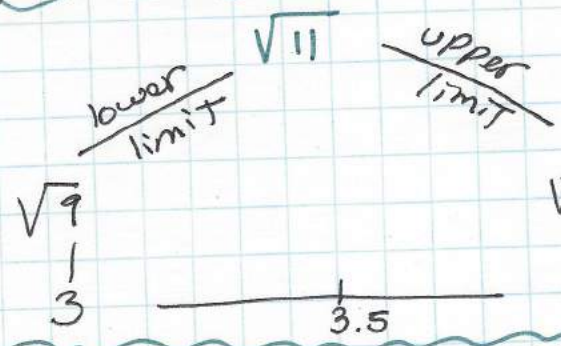
a)



- 6 is 3 units away from 9
- 6 is 2 units away from 4
- so, $\sqrt{6}$ is less than 2.5

A good estimate → $\sqrt{6} \approx 2.4$

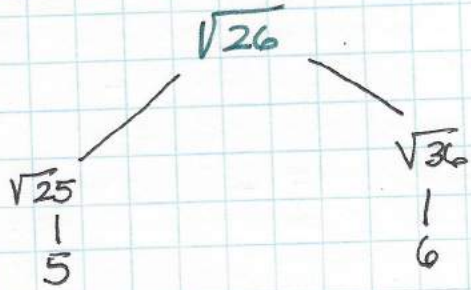
b)



- 11 is 2 units away from 9
- 11 is 5 units away from 16
- so, $\sqrt{11}$ has to be closer to 3

A good estimate $\sqrt{11} = 3.2$

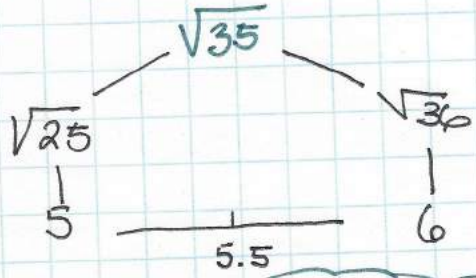
c)



- 26 is very close to 25, so

A good estimate is $\sqrt{26} \approx 5.1$

d)



- 35 is very close to 36, so

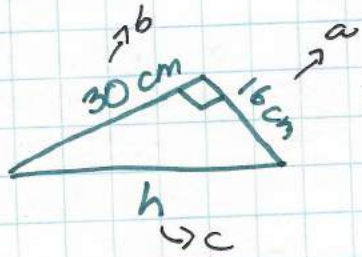
$\sqrt{35} \approx 5.9$

- Try e) → answer = 8.2

f) → answer = 9.3

18) Find the side labelled with a variable.

a)



Remember:
- the hypotenuse is right across from the right angle and it is always the longest side.

The pythagorean theorem states that:

$$c^2 \text{ (hypotenuse)}^2 = a^2 + b^2$$

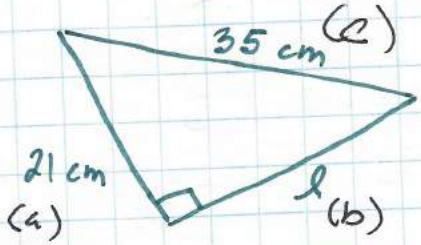
So: $h^2 = (30 \text{ cm})^2 + (16 \text{ cm})^2$

$h^2 = 900 \text{ cm}^2 + 256 \text{ cm}^2 = 1,156$

But, dont forget $h^2 = 1,156 \text{ cm}^2$, then $h = \sqrt{1,156 \text{ cm}^2}$

$$h = 34 \text{ cm}^2$$

b)



In this case, c is given. So, we have to find b.

Remember:

$$c^2 = a^2 + b^2 \rightarrow c = \sqrt{a^2 + b^2}$$

$$b^2 = c^2 - a^2 \rightarrow b = \sqrt{c^2 - a^2}$$

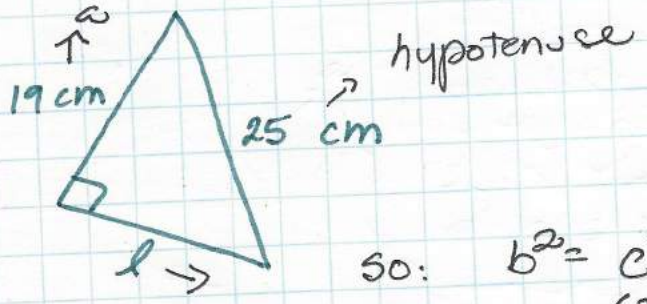
$$a^2 = c^2 - b^2 \rightarrow a = \sqrt{c^2 - b^2}$$

$l^2 = (35 \text{ cm})^2 - (21 \text{ cm})^2$

$= 1225 \text{ cm}^2 - 441 \text{ cm}^2$

$l^2 = 784 \rightarrow l = \sqrt{784} = 28 \text{ cm}$

c)



So: $b^2 = c^2 - a^2$

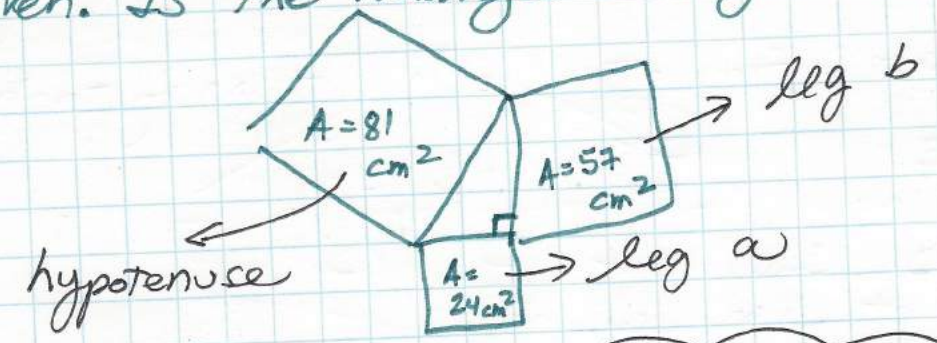
$= (25\text{ cm})^2 - (19\text{ cm})^2$

$= 625\text{ cm}^2 - 361\text{ cm}^2$

$b^2 = 264$

or $b = \sqrt{264} = 16.24\text{ cm}$

(19) The area of each square on each side is given. Is the triangle a right triangle?



Remember: For a right triangle

Area of square of hypotenuse = Area of square of leg a + Area of square of leg b

So:

81 cm^2 should be $= 57\text{ cm}^2 + 24\text{ cm}^2$

But

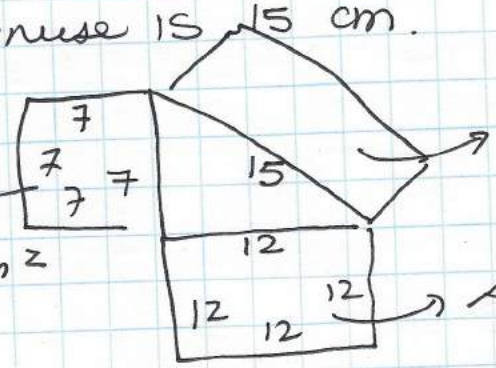
81 cm^2 is ~~not~~ equal to $(57+24) = 81$

So, the triangle is a right triangle

(21) A triangle has side lengths 7 cm, 12 cm, and 15 cm.
Is the triangle a Right triangle?

Remember: • the hypotenuse is the longest side
• Right Triangle → Area of square of hypotenuse = Area of leg a square + Area of leg b square

So: hypotenuse is 15 cm.



Area is $15 \times 15 = 225\ cm^2$

Area of leg $= 49\ cm^2$

Area of leg $= 12 \times 12 = 144\ cm^2$

So: $225\ cm^2$ should be $= \underbrace{144\ cm^2 + 49\ cm^2}_{193\ cm^2}$

225_{cm^2} is NOT 193_{cm^2}

Thus, the triangle is NOT a Right triangle

(22) Identify the sets of numbers that are Pythagorean Triplets.

a) 24, 32, 40
- 40 is hypotenuse. Its square would have an area of $40 \times 40 = 1600\ cm^2$
- 32 is one leg. Its square would have an area of $32 \times 32 = 1024\ cm^2$
- 24 is one leg. Its square → $A = 24 \times 24 = 576\ cm$

So $1600\ cm^2$ should be $= 1024\ cm^2 + 576\ cm^2$

It is!

Thus, 24, 32, 40 form a Right Triangle, and thus are called "Pythagorean Triplets

In cm^2

b) 11, 15, 24

24 hypotenuse. Its Square → Area = $24 \times 24 = 576$
15 is a leg. Its Square → Area = $15 \times 15 = 225$
11 is a leg. Its Square → Area = $11 \times 11 = 121$

576 Should be = 225 + 121
576 ≠ 346

Because it is not equal
11, 15, 24 Do not form a right Triangle
Therefore, they are NOT A pythagorean Triplet

In cm^2

c) 25, 60, 65

65 hypotenuse → Square Area = $65 \times 65 = 4225$
60 leg → Square Area = $60 \times 60 = 3600$
25 leg → Square Area = $25 \times 25 = 625$

Thus $3600 + 625 = 4225$
↳ equal to 4225

∴ 25, 60, 65 form a right Triangle
thus, they are a pythagorean Triplet

d) 5, 8, 9

hypotenuse → 9 square Area = $9 \times 9 = 81$
leg → 8 square Area = $5 \times 5 = 25$
leg → 5 square Area = $8 \times 8 = 64$

So, 81 should be equal to 25 + 64

But $25 + 64 = 79$

Thus $81 \neq 79$

5, 8, 9 Do not form a Right Triangle
5, 8, 9 are NOT A Pythagorean Triplet