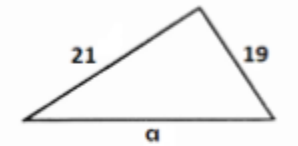
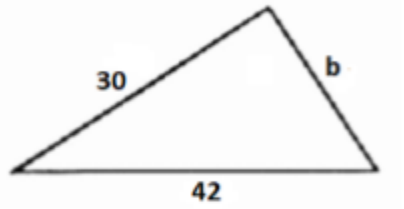
UNIT 9: GEOMETRY

Exercise 1: The sides of a triangle have lengths 7 cm, 10 cm and 13 cm. The sides of another triangle have lengths 12.6 cm, 18cm and 23.2 cm. Are they similar?

Exercise 2: Find the values of the unknowns a and b so that the following triangles are similar:



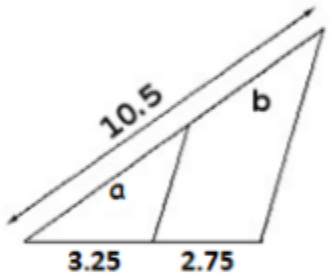


Exercise 3: The scale factor of two similar pyramids is $k = 2.3$. If the area of the first one is $192\ \text{cm}^2$ and its volume is $574\ \text{cm}^3$, find the area and the volume of the second pyramid.

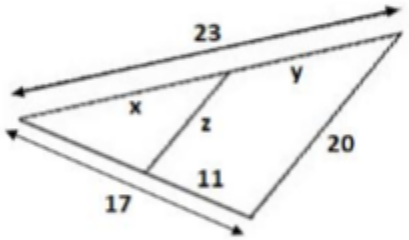
Exercise 4: We have two similar prisms with areas of $A_1 = 54\ \text{m}^2$ and $A_2 = 105.84\ \text{m}^2$. Find the scale factor.

Exercise 5: Find the values of the unknowns:

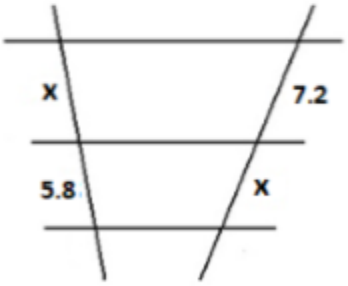
a)



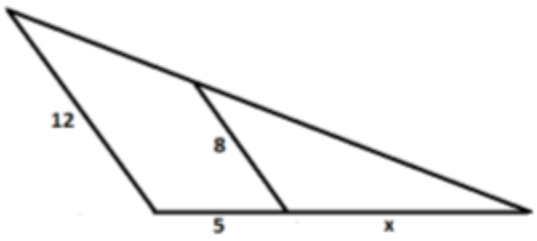
b)



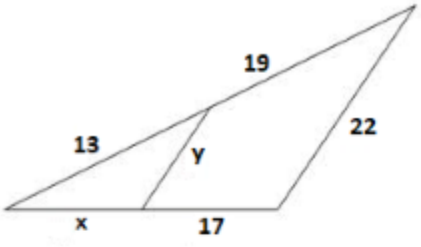
Exercise 6: Find the value of x:



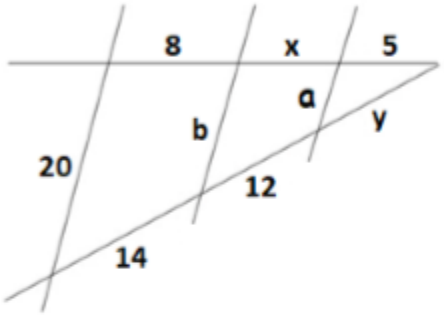
Exercise 7: Work out the value of x in this figure knowing that the triangles are similar:



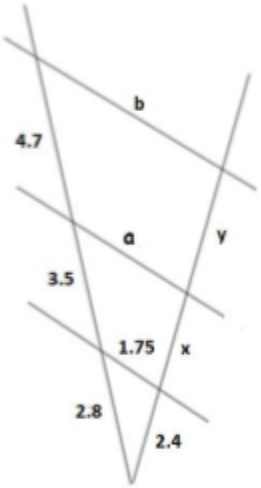
Exercise 8: Work out the values of **x** and **y** in this figure:



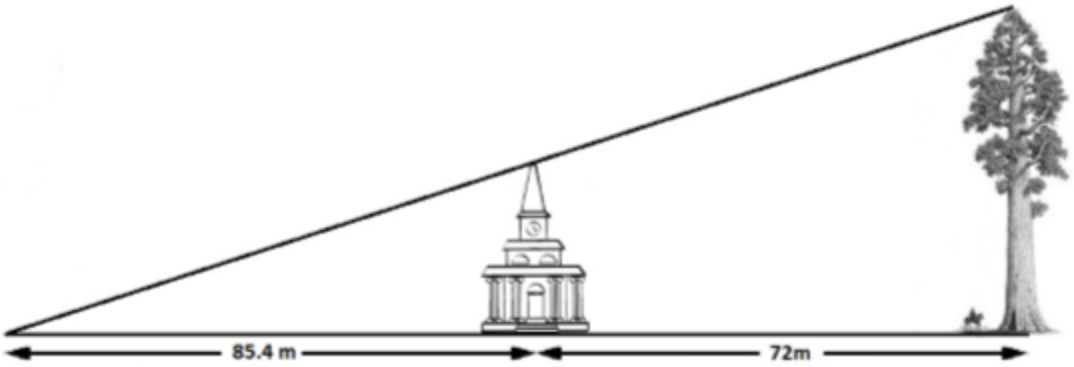
Exercise 9: Use the intercept theorem to work out the values of the indeterminates (a, b, x, y)



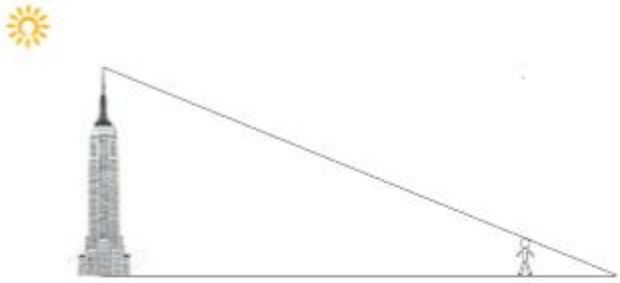
Exercise 10: Use the intercept theorem to work out the values of the indeterminates (a, b, x, y)



Exercise 11: One of the tallest organisms on earth is the giant sequoia, which rises to an average height of 87 m. This year, during my summer holidays in the States, I want to use that information to work out the height of the church tower of a quaint little village in Oregon. Could you give me the answer? I am on a holiday and I just don't feel like solving it.

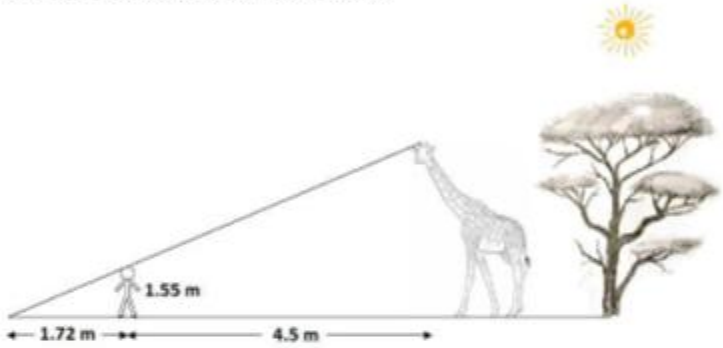


Exercise 12: Find the length of my shadow if the Empire State Building has a height of 381 m, I am 1.53 m high and I am standing 350 m away from it



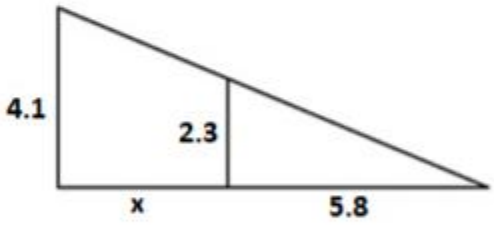
Exercise 13: I am lying on the turf of the garden playing with my stuffed alpaca, which is 35 cm high, and I realize that if I stretch my arm completely I can hide the 3.75 m high jacaranda that's on the other end of the garden. If my arm has a length of 57 cm, how far away am I standing from the tree?

Exercise 14: Find the height of the giraffe and the tree.

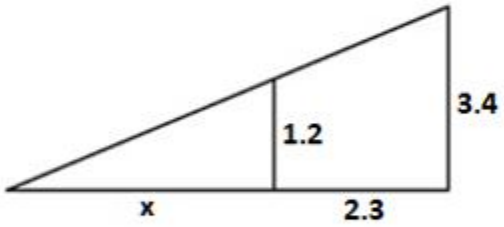


Exercise 15: Find the value of x in the following figures using the intercept theorem:

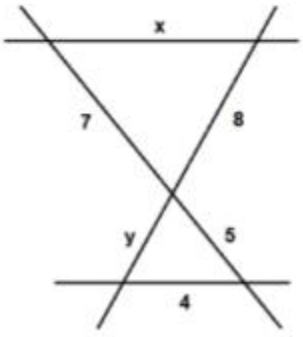
a)



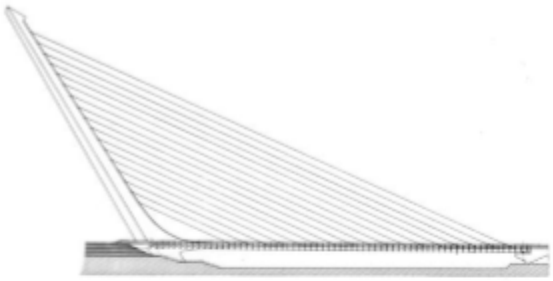
b)



Exercise 16: Find the values of the indeterminates:



Exercise 17: The Alamillo Bridge in Seville is held in place by a set of 13 parallel cables. Knowing that the cables touch the mast with a separation of 10 m and that the last and longest one has a length of 300 m, find the total length of cable used to hold the bridge in position.



Exercise 18: Find the area of an equilateral triangle if its sides have lengths of 23 cm

Exercise 19: Find the area of an isosceles triangle if its base measures 7 cm and the length of the equal sides is 1.3 dm

Exercise 20: If an equilateral triangle has an altitude of 27 m, find the length of each side

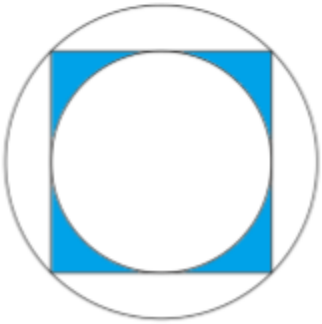
Exercise 21: Find the area and the perimeter of a right-angled trapezium if the bases measure 21 cm and 28 cm and the slanted side has a length of 13 cm

Exercise 22: Find the area of an isosceles trapezium if the bases measure 53 cm and 77 cm and the slanted side has a length of 27 cm

Exercise 23: Find the area of a regular octagon if the length of the side is 20 cm and the radius has a length of 15 cm

Exercise 24: Find the area of a hexagram with sides of length 19 cm

Exercise 25: Find the area of the shadowed region if the circles have radii of lengths 12 cm and 8 cm

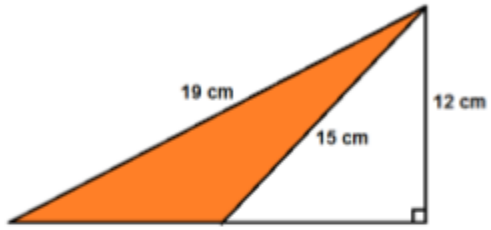


Exercise 26: Two ships leave the harbor at the same time. One of them travels 12 miles south and then 8 miles east, while the other travels 7 miles west and then 13 miles north. How far apart are they?

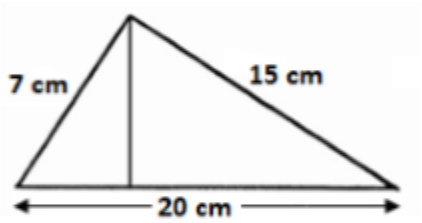
Exercise 27: Work out the value of the sides of a right-angled triangle if they measure $x+9$, $x-7$, and $x+7$

Exercise 28: Use Pythagoras' theorem to work out the lengths of the sides of a right-angled triangle if the sides measure $x-4$ and $3x+1$, and the hypotenuse has a length of $4x-11$

Exercise 29: Work out the area of the shaded triangle

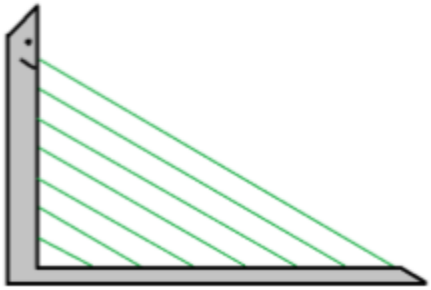


Exercise 30: Find the area of this triangle:

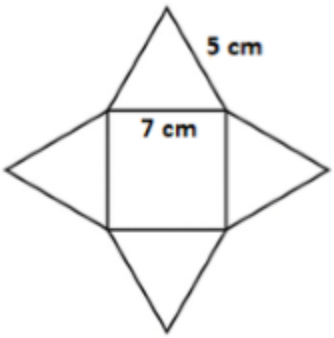


Exercise 31: A bamboo tray has a hexagonal form with regular sides of length 4.53 inches and border of width 0.4 inches. Find the useable surface of the tray.

Exercise 32: A right-angled shaped bridge is held in place by 13 cables that go from the base of the bridge to the mast. The cables on the base are placed 18 meters apart, and they touch the mast 10 meters away from each other. How many meters of cable have been used?



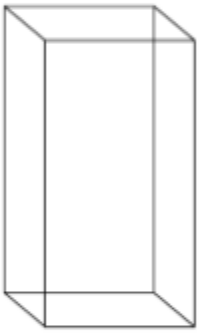
Exercise 33: Find the area of the following figure:



What figure do you get if you pick the vertices of the triangles and bend them upwards until they coincide?

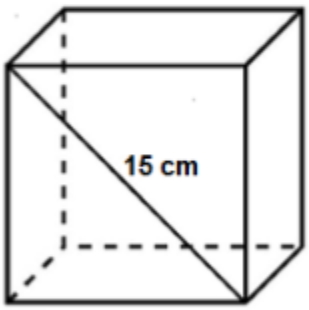
Exercise 34: Work out the axial diagonal D of a cuboid with sides 10 cm, 12 cm, and 15 cm

Exercise 35: The axial diagonal of a cuboid is 20 cm, and the sides of the base are 9 cm and 7 cm. Find its area.
Hint: Work out the value of the altitude first

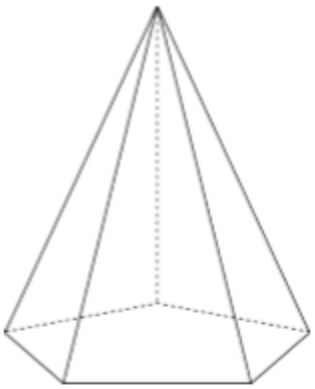


Exercise 36: The axial diagonal of a cuboid has a length of 15 cm, and two of its edges have lengths of 7 cm, and 10 cm. Find its area and its volume.

Exercise 37: Work out the area and the axial diagonal of a cube if the diagonal of one of its faces has a length of 15 cm



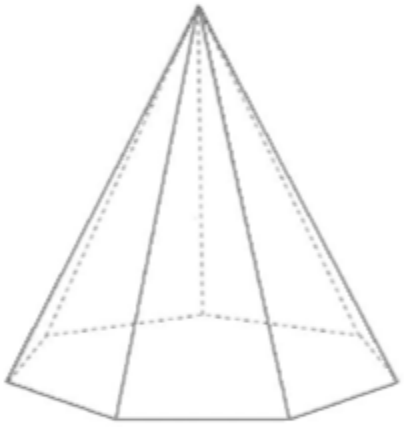
Exercise 38: Work out the value of the area of a regular pentagonal pyramid with altitude of length 15 cm if the length of the side of the base measures 12 cm and its radius measures 10 cm.



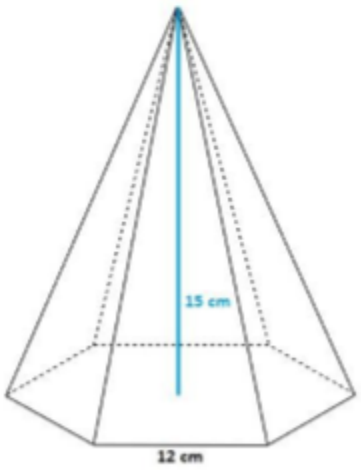
Exercise 39: Work out the value of the area of a regular pentagonal pyramid with altitude 9 cm if the length of the side of the base is 7 cm and its edge measures 12 cm

Exercise 40: Work out the value of the area of a regular octagonal pyramid with altitude 12 cm if the length of the side of the base is 9 cm and the edge is 13 cm

Exercise 41: Work out the area of a regular heptagonal pyramid with radius 12 cm, if the length of the side of the base is 15 cm and the length of the edge is 17 cm



Exercise 42: Work out the area of this regular hexagonal pyramid



Exercise 43: A bottle of perfume is shaped like a regular square pyramid. If the length of the side of the base is 8 cm and the bottle has an altitude of 14 cm, work out the amount of crystal needed to produce it.

Exercise 44: Cheops' Pyramid has an altitude of 138 m and its base is a square with sides of length 227 m. Find its surface.