

## Unit 6 - Classwork 4: Pythagoras and Hippasus

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In order to answer the following 20 subquestions (of the following 8 prompt questions), read pages 48—53 in Unit 6.

1. Draw the tetractys.

2. According to Pythagoras, each material element is in the shape of a regular polyhedron.

(i) The four classical elements are earth, water, air, and fire. According to Pythagoras, what is the shape of each classical element?

(a) Earth: \_\_\_\_\_

(b) Water: \_\_\_\_\_

(c) Air: \_\_\_\_\_

(d) Fire: \_\_\_\_\_

(ii) According to Pythagoras, what is the fifth element?

(iii) According to Pythagoras, what shape is the fifth element?

(iv) In order for a polyhedron to exist, at least four points must exist. Hence according to Pythagoras, if a material element exists, then at least four points must exist. In that case, if only four points exist, then what is the only material element that can exist? Explain your answer.

(v) According to Pythagoras, God created the universe out of which material elements?

3. According to Hippiasus, the Pythagorean Theorem proves that certain shapes make no sense in terms of Pythagorean numbers
  - (i) According to Pythagoras, what are numbers?
  - (ii) The Pythagorean theorem is  $a^2 + b^2 = c^2$ . If  $a = 2$  and  $b = 2$ , then what number does  $c^2$  equal? Show your work.
  - (iii) The Pythagorean theorem is  $a^2 + b^2 = c^2$ . If  $a = 2$  and  $b = 2$ , then what number does  $c$  equal? Show your work.
  - (iv) The Pythagorean theorem is  $a^2 + b^2 = c^2$ . If  $a = 2$  and  $b = 2$ , then why doesn't  $c$  equal a Pythagorean number?
  - (v) The three kinds of triangles are the scalene, the isosceles, and the equilateral, and every right triangle is either a scalene or an isosceles. Which kind of right triangle always has a side that *cannot* be measured in terms of Pythagorean numbers? Explain your answer.
4. Between geometry and arithmetic, which did Pythagoras think is more trustworthy?
5. Hippiasus disagreed with Pythagoras about what the ἀρχή is.
  - (i) According to Pythagoras, what is the ἀρχή?
  - (ii) According to Hippiasus, what is the ἀρχή?