**2022 Mini Mu – Geometry Solution**

1. Answer B

The formula for the area of an isosceles trapezoid is given by , where a and b are the lengths of the bases and h is the height, so the area of the trapezoid is light years2.

1. Answer C

PA is perpendicular to AO so using the Pythagorean theorem, we can get the equation:

solving, we get thus the diameter is .

P

A

B

C

O

1. Answer D.

so perimeter of triangle . .

P

A

B

C

D

E

1. Answer: A

Since BC is 3 meters, AD is also 3 meters since they are equal. AB is given to be 4 meters, and DC is 4 meters as well since half of it, NC, is equal to 2 meters (200 cm = 2 m) as N is the midpoint of DC. Thus the perimeter is AB + BC + CD + DA = 4 + 3 + 4 + 3 = 14 m.

1. Answer: D

Since AEDC and CGFB are squares, their areas can be found by squaring their side lengths, which are 3 and 4 meters, respectively. Thus, the sum of the areas of the squares is The triangle’s area is equal to or , where a and b are the length of the legs of the triangle. The total area of the heptagon is then .

1. Answer D

Rotate triangle degree around point , . . . Then PQ=. , so . . Apply law of cosines, we get .

A

B

C

D

P

Q

1. Answer B

Draw a line CF with . It intersects AB at F, intersects BE at G. is an equilateral triangle. . Then n . Then BE=CF, GE=GF. Then is an equilateral triangle.

then BC=BD=BG. Then Then So DF=DG. Then , then .

A

B

C

D

E

F

G

1. Answer A

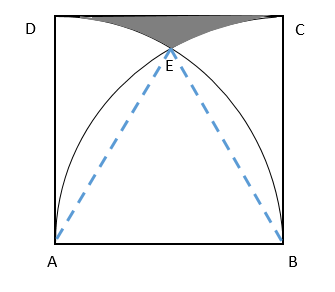
Sector ABD area is ;

Sector BCE and ADE areas are each ;

Square ABCD area is 4

The area of is

The area of shaded section is



1. Answer: B

Since the scale factor between the area of similar triangles is the square of the scale factor between their perimeters, we can square root the ratio 49:64 and obtain 7:8. However, since the question asks for the ratio of DEF to ABC, then we must switch the values in the ratio and find our answer to be 8:7.

10. Answer B

After 4 seconds, Cyrus is at (8,0) and Wesley is at (0,6). The distances are 15, 20, and 10. Sum is 45.

11. Answer: D

Solution: the ratio of the volumes is the ratio of the radius cubed and the ratio of the surface areas is the ratio of the radius squared so. Cube root of 8/125 squared is 4/25

12. Answer E ( 78 degrees)

Solution: 5x-46 = 2x + 5 => x = 17. 7x – 41 = 78.

13. Answer A

Solution: angle is 180 – 43 = 137 degrees. It supplementary angle is 180 – 137 =43 deg

14: Answer A

Solution: MNOPQRST is a rectangular prism. Its base is ½ ; its height is . So its volume is .

15. Answer D

The height of original boba cone is 12. The radius of its base is 9. The slant height is 15.

The base area is ; the area of lateral surface of the cone is

The total surface area of the original cone is .

16. Answer C

The base area is +=

The area of lateral surface of the frustum is

Total area is .

17. Answer A

Since the smaller meteor has a surface area of, it has a radius of 2 meters, given by . Then its volume is , given by . Thus, the hole it makes in the larger meteor has a volume of . Since the larger meteor has a diameter of meters, it has a radius of meters and consequently a volume of . Subtracting the volume of the hole from the volume of the larger meteor, , the volume that is left.

18. Answer C

Plugging mass and constants into the formula for Schwarzschild radius gives . Simplifying this expression gives m

19. Answer D

AC is the hypotenuse and AB is a leg. Use the Pythagorean theorem to find the length of the leg BC by to get BC = 48. Plug AB=20 and BC=48 into for area of a triangle is 480. The triangle formed by the AGNs has area equal to one-fourth the area of the larger triangle as it is formed from picking vertices at the midpoints of the larger triangle, thus its area is 480/4 = 120.

20. Answer E

Calculate the area of the circle as πr^2. The area equals 64 π. Find the angle traversed by 6.5 hours and 11 hours. Since 360/12hours=30, each hour is 30 degrees. 6.5\*30=195 degrees and 11\*30=330 degrees. 330-195=135. 135/360=3/8. 3/8\*64 π =24 π

21. Answer D

Find the volume of the cylinder , frustum , and hemisphere Then multiply by 0.7 to find the volume of fuel to get 164325 π m^3.

22. Answer D

The two non vertical lines intersect x = 0 at (0, 0) and (0,9) and both intersect x = 9 at (9, 13.5). Thus we rotate this triangular region to obtain a shape that resembles a larger cone with a smaller cone within missing. To solve this problem we can let the volume of the region equal the volume of a larger cone with a diameter from (-9, 13.5) to (9, 13.5), or 18 and height from (0,13.5) to (0,0), or 13.5, subtracted by a smaller cone with the same diameter but height from (0, 13.5), to (0, 9), or 4.5. Using for the volume of a cone, the volume of the region is equal to

23. Answer A

Since sin L is equal to VL/LC, it is equal to 285/293.

24. Answer A

For a given perimeter, the area enclosed by a regular polygon will increase as the sides increase to infinity (as a circle is the most efficient use of perimeter to maximize area). Therefore, an equilateral triangle of side length 7 has the minimal area. By the formula A = s^2sqrt3/4, the minimum area the plate can be is

25. Answer E

Transitive Property states that if a=b, and b=c, then a=c.

26. Answer C

Use pick’s theorem to find the number of available lattice points, then add the edges. 330 = X + 62/2 -1. X=300 and 300+62=362 points.

27. Answer A

We can solve the height of the pyramid by using the apothem of the hexagon to find the side length of one of its six component triangles. By 30-60-90 triangles, the side length is 5 and by the 5-12-13 triangle, we find that the height of the pyramid to be 12. We then find the area of the base by multiplying ½bh for each of the component triangles and then multiplying by 6 to get the area of the hexagonal base. The base has an area of (75sqrt3)/2. We multiply 1/3bh for the volume of the pyramid and get 150sqrt3. We plug this into Einstein’s equation and get 1350sqrt3 x 10^16 which becomes 1.35 x 10^19.

28. Answer D

The number of diagonals of a regular polygon with n sides is given by n(n-3)/2. Therefore, the 420-sided polygon has 420 x 417 / 2 = 87570 sides and the 69-sided polygon has 69 x 66 / 2 = 2277 sides. Dividing 87570 by 2277 gives a remainder of 1044.

29. Answer C

Nelson’s height is converted to inches from 5’10 to 70 inches. 2/3 πr^3 is used to calculate the volume of the hemisphere. Plugging in the numbers, we get 686000 π/3 .

30. Answer B

Using similar triangles of the cross section of the two cones, we get the following figure:

4

b

a

12-b

6

We can use similar triangles to get so b=2a. We also can use similar triangles to get Substituting gives us Cross multiplying and solving gives us a=2.4. This means that b=4.8 and 12-a=7.2. We can now solve for the volume of two cones and add them, one with radius of 2.4 and height of 4.8 and other of radius of 2.4 and height of 7.2. Solving gives us =.

31. Answer B

Line equation: 2x + y = 5. The shortest distance from a point to a Line is:

Line is in the xy plane so the can be ignored.

Plug and chug: distance from line to center of sphere is 2. 2-radius = 2-1 = 1.

(TB) Eccentricity= c/a, where c is the length from the center to one focus and a is the length of the semi-major axis. By the Pythagorean relation, c^2=a^2-b^2. We plug in a^2=9 and b^2=6 and get c^2=3, thus c=sqrt3 and the eccentricity is (sqrt3)/3.