

SOLUTIONS:

1) D

Area of big rectangle =
 $(x+9)(x) = x^2 + 9x$
 Area of square = x^2
 $x^2 + 9x = 117 + x^2$
 $9x = 117$
 $x = 13$

2) B

$A = \{6, 9, 12, 15, 18, 21\}$
 $B = \{8, 12, 16, 20, 24, 28\}$
 12 is the only number in common.

3) E

K H Da 1 D C M
 2.0 0

4) D

C	B	A
-4	5	14

5) C

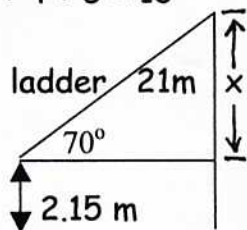
$x = \text{acute angle}$ $y = \text{obtuse angle}$
 $x + y = 140$ $x = 140 - y$
 $2(180 - y) + 3(90 - x) = 340$
 $360 - 2y + 270 - 3(140 - y) = 340$
 $y + 210 = 340$ $y = 130$ $x = 10$
 $130/10 = 13$

6) B

1) T 2) F 3) T 4) T 5) T 6) F
 $1 + 3 + 4 + 5 = 13$

7) D

$\frac{x}{21} = \sin 70^\circ$



$x \approx 19.73 + 2.15$ $x \approx 21.88$

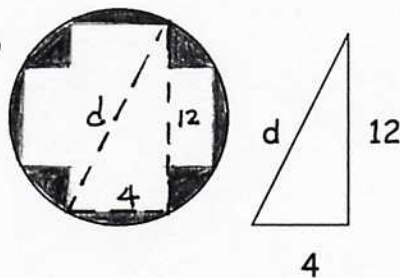
8) D

Area of square = s^2
 Area of circle = πr^2 $r = 1$
 $s^2 = \pi$ $s = \sqrt{\pi}$

9) E

$r = 4\sqrt{3}$ $C = 2\pi(4\sqrt{3}) = 8\pi\sqrt{3}$

10) D



$4^2 + 12^2 = d^2$ $16 + 144 = d^2$
 $160 = d^2$ $d = 4\sqrt{10}$
 $r = 2\sqrt{10}$

Area of circle = $\pi(2\sqrt{10})^2 = 40\pi$
 Area of polygon = $16 \times 5 = 80$
 Area of shaded area = $40\pi - 80 \approx 45.7$

11) B

$2\pi r = 4s$ $\pi r^2 = \pi \left(\frac{2s}{\pi}\right)^2 = \frac{4s^2}{\pi}$
 $r = \frac{4s}{2\pi}$ $\frac{4s^2}{\pi} > s^2$

12) A

slope of BC = $-5/4$
 slope of altitude = $4/5$
 $y = (4/5)x + b$
 $A(-4, 0)$ $0 = (4/5)(-4) + b$
 $b = 16/5$ $y = (4/5)x + 16/5$
 $4x - 5y = -16$
 $A = 4, B = -5, C = -16$
 $4 + (-5) + (-16) = -17$

13) A

$$x^2 + 10x + 25 + y^2 = -16 + 25$$

$$(x+5)^2 + y^2 = 9$$

center $(-5, 0)$, $r = 3$

$$-5 + 0 + 3 = -2$$

14) E

$$a(a+3) = (a+1)(a+2)$$

$$a^2 + 3a = a^2 + 3a + 2$$

impossible for segments with any dimension.

15) C

$$m\angle EHF = 12$$

$$m\angle ADG = 60$$

$$m\widehat{GH} = 84$$

$$12 + 84 + 60 = 156$$

16) D

$$\widehat{RQ} = 140 - 26 = 114$$

$$\frac{\widehat{MK} + \widehat{RQ}}{2} = \frac{(140 + 114)}{2} = 127 =$$

$$m\angle RPQ$$

$$180 - 127 = 53 = m\angle RPK$$

$$53 \times 3.5 = 185.5$$

17) A

$$V \text{ of sphere} = \frac{4}{3}\pi \cdot 3^3 = 36\pi, V \text{ of}$$

each disk is $\frac{1}{2}\pi$, using that V,

find the thickness of each disk,

$$\frac{\pi}{2} = Bh, \frac{\pi}{2} = 4\pi \cdot h, h = \frac{1}{8}, 0.125$$

18) D

$$x^2 + 8x + 16 + y^2 - 10y + 25 = -5 + 16 + 25$$

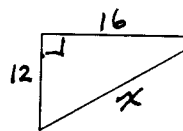
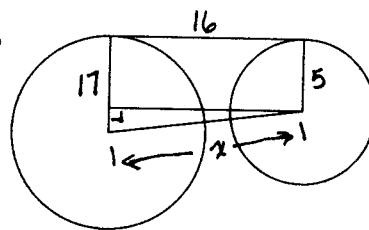
$$(x+4)^2 + (y-5)^2 = 36$$

$$(-4, 5), r = 6$$

$$\text{side of square} = 6\sqrt{2}$$

$$\text{Area of square} = (6\sqrt{2})^2 = 72$$

19) C

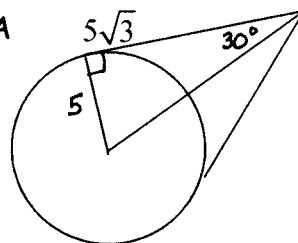


$$17 - 5 = 12$$

$$12^2 + 16^2 = x^2$$

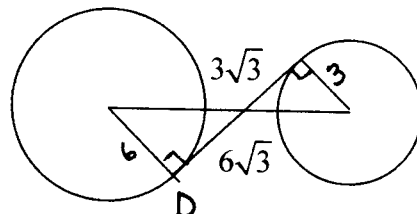
$$x = 20$$

20) A



$$5\sqrt{3} \times 2 = 10\sqrt{3} \approx 17.3$$

21) A



$$6\sqrt{3} + 3\sqrt{3} = 9\sqrt{3} \approx 15.6$$

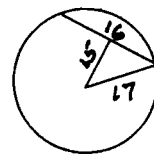
22) D

$$C = 2\pi(17) = 34\pi$$

$$A = 289\pi$$

$$2(289\pi - 34\pi) = 510\pi$$

$$\approx 1602.2$$



23) C

$$\left[\frac{X}{2}, \frac{Y}{2}, \frac{Z}{2} \right]$$

$$\left[\frac{3\sqrt{2} + (-\sqrt{2})}{2}, \frac{2\sqrt{15} + 0}{2}, \frac{-5\sqrt{3} + \sqrt{27}}{2} \right]$$

$$\left(\frac{2\sqrt{2}}{2}, \sqrt{15}, \frac{-5\sqrt{3} + 3\sqrt{3}}{2} \right)$$

$$(\sqrt{2}, \sqrt{15}, -\sqrt{3})$$

24) D

$$\text{y values } \frac{9-3}{3} = 4$$

$$-3 + 4 = 1 + 4 = 5$$

$$\text{x values } \frac{8-2}{3} = 2$$

$$2 + 2 = 4 + 2 = 6$$

trisection points are (6, 5) and (4, 1).

$$(4 + 6)(1 \times 5) = 50$$

25) A

$$AB = \sqrt{(5-1)^2 + (7-10)^2} = \sqrt{16+9} = 5$$

$$BC = \sqrt{(1+3)^2 + (10+8)^2} = \sqrt{16+324} = \sqrt{340} = 2\sqrt{85}$$

$$AC = \sqrt{(5+3)^2 + (7+8)^2} = \sqrt{64+225} = 17$$

$$15+17+2\sqrt{85} \approx 40.4$$

26) C

$$\frac{m-1}{-8-2} = \frac{1-(m+1)}{11-7} \quad \frac{m-1}{-10} = \frac{-m}{4}$$

$$4m-4 = 10m \quad -4 = 6m \quad m = \frac{-2}{3}$$

27) D

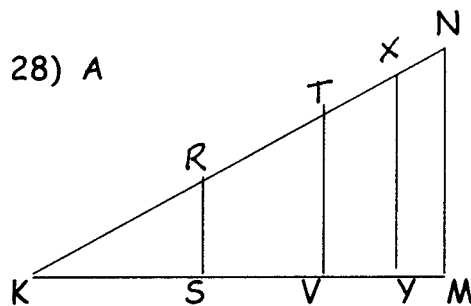
6, 7, 8 is an acute triangle

$$6^2 + 7^2 > 8^2$$

$$6 + 7 + 8 = 21$$

$$\sqrt{21} \approx 4.6$$

28) A



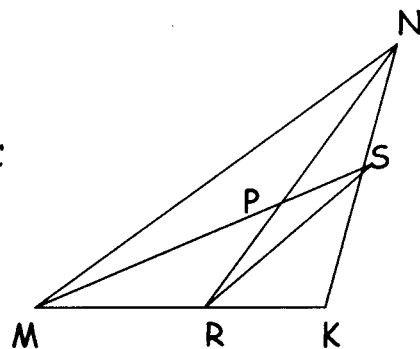
RS = 3, TV = 5, XY = 6.5, and NM = 8

$$\sqrt[3]{(3+5)^2 |6.5-8| + (3+5+2(6.5)+8)}$$

$$\sqrt[3]{8^2 |-1.5| + 29} = \sqrt[3]{64(1.5) + 29}$$

$$\sqrt[3]{96+29} = \sqrt[3]{125} = 5$$

29) C



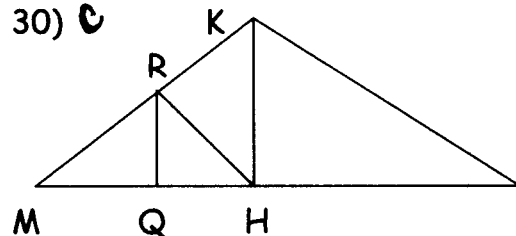
If MS = 15, then PS = 5;

if NR = 18, then PR = 6;

and if MN = 21, then RS = 10.5

$$5 + 6 + 10.5 = 21.5$$

30) C



MK = 40; MH = 20; MR = 10; MQ = 5

$$40 + 20 + 10 + 5 = 75$$