Solutions:

1. **C**. 14 X 4 = 56
2. **C**. C(3, 2)/C(4,3) = 3/4.
3. **C**. Shaded is 16(16)-3(triangles)=

 = 256-$\frac{1}{2}(8)(8)-\frac{1}{2}(8)(16)-\frac{1}{2}(8)(16)$ = 96. Unshaded is just the triangles which is 160.

96/160 = 3/5.

4. **B**. The distance from the focus to the

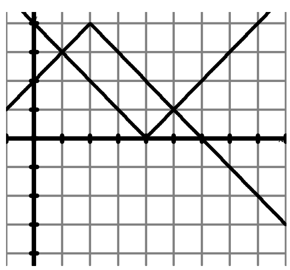
 directrix is $\frac{2x_1+1y_1-6}{\sqrt{2^2+1^2}}=\frac{12\sqrt{5}+6-6}{\sqrt{5}}=12$. The distance from the focus to the vertex is then

6 and

 the latus is 4 times this which is 24.

5. **B**. The surface area is circumference times h plus bases, which is 80π plus $2(\pi 4^2)$ so K = 80+32=112.

6. **C**. The height of the parallelogram is $\sqrt{2}$ and length is $3\sqrt{2}$. Area 6.



7. **A**. $X=0.2Y$, $Y=0.5Z$ so

 X/Z = 0.2Y/(2Y) = 0.1 = 10%.

8. B. $x^2+1=3x-\frac{5}{4}$; $4x^2-12x+9=0$

 factors to $(2x-3)^2=0$ so x=3/2. Then

 y=13/4 and the sum is 19/4 = 4 3/4

9. **B**. 42 + 10 (and two caps) + 2 (and two caps)

 which gives 55 (the last cola with the extra caps).

10. **C**. 76 + 19 + 4 (and 3 caps) + 1 + 1 = 101. 2(76)+1=153

11. **D**. $(x+1)^2+(y-3)^2=144$ so the arc is

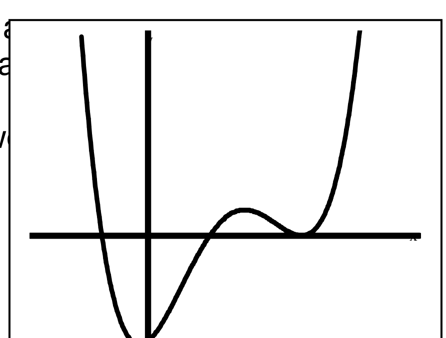
 30/360 times 2(12)π = 2π.

12. **B**. The roots a

 -3, 4 and 10, a

 the x=10 root

 has an even pow



which causes no change of sign. So L= -2 and the graph of $f(|x|)$ has the right side the same, and the negative part of the domain is a reflection over the y-axis. The negative values are at x= -3, -2, -1, 0, 1, 2, 3 and so N=7. Sum is 5.

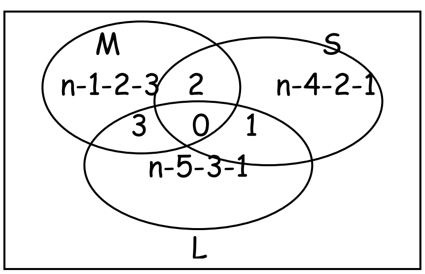
-3 4 10

13. **A**. $\frac{1}{2}\bullet\frac{1}{2}\div\frac{1}{2}=\frac{1}{2}$

14. **A**. Square both sides: $3x+(1+\sqrt{2x})=1+2\sqrt{2x}+2x$ so $x=\sqrt{2x}$. Square both sides and x=0 or x=2, but the solution must be 2. And $(2\sqrt{2})^2=8$.

15. **B**. Either A throws more heads than B, or A throws more tails than B, but since A has only one extra coin, not both. By symmetry, these two mutually exclusive possibilities occur with equal probability. Therefore the probability that A obtains more heads than B is 1/2. It is surprising that this probability is independent of the number of coins held by B, if A has one more.

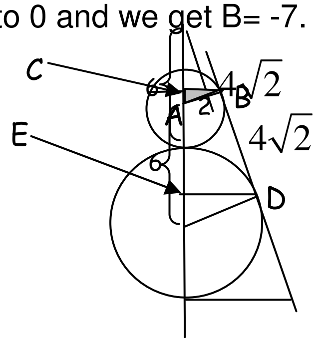
16. **D**.



2n= 3n-16 so n=16.

17. **B**. The sum is 0 so A=0. The product of the roots are -6 so C is 6. Substitute 1 for x and set equal to 0 and we get B= -7. A-B+2C = 0+7+12 = 19.

18. **D**.

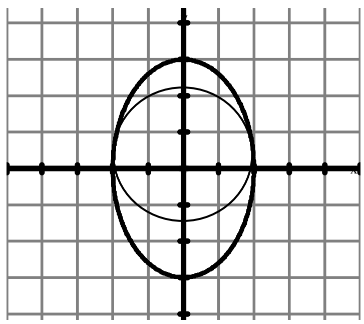


Due to similar triangles, we have the measures above. Now the area of ΔABC is 1/2 (2)($4\sqrt{2}$) must be equal to $1/2(6)(BC)$ so BC=$\frac{4\sqrt{2}}{3}$. By the same reasoning we get DE = $\frac{8\sqrt{2}}{3}$. Use the
Pythagorean Th. to get C to the center of the small circle is 2/3, and similar reasoning to get the small leg from E to the big circle center is 4/3. So if we place the center of the cone at (0, 0) then

D has coordinates ($\frac{8\sqrt{2}}{3}$,16/3) B ($\frac{4\sqrt{2}}{3}, \frac{32}{3}$). The eq of line BD is $y-\frac{16}{3}=2\sqrt{2}(x-\frac{8\sqrt{2}}{3})$.

We want the point (r, 0) so let y=0 and r= $4\sqrt{2}$.

19. **E**. The foci are each $\sqrt{5}$ from the center. So the distance is $\sqrt{5}-2$



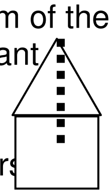
20. B. Multiply by the conjugates of each denominator to get $\frac{\sqrt{x}+1}{x-1}+\frac{\sqrt{x}-1}{x-1}=\frac{2\sqrt{x}(\sqrt{x}-1)}{x-1}$

and for x not 1, this simplifies to $2\sqrt{x}=2x-2\sqrt{x}$. $4\sqrt{x}=2x$, $16x=4x^2$
so x=0 or x=4. Sum 0+4=4.

21. **A**. The black is half the circle.

22. **B**. 2n+101 is divisible by 5 if n=7, n=12, n=17, n=22, etc. The least for which 2n-1 is divisible by 3 is n=17 and 33 is 2n-1 and the sum of the digits is 6.

23. **C**. The shortest distance is the slant height plus the square's apothem. 10+6=16.



24. **C**. 4 birds can eat 5 cobs in 2 hours
6 birds can eat 7.5 cobs in 2 hours.
6 birds can eat 7.5(1.5) in 3 hours. 11.25 cobs.

25. **A.** 16 backpacks with 8 cats in each gives $2^4 \bullet 2^3 = 2^7$ cats, times 4 legs each, gives 2^9. Add 8 legs for the girls. $2^9+2^3=2^3(2^6+1)$

26. **B**. Original volume is

$\frac{1}{3}\pi(14)(10^2)-\frac{1}{3}\pi\left(\frac{20}{7}\right)^2(4)$ and the

"dropped" volume is

$\frac{1}{3}\pi(14)(10^2)-\frac{1}{3}\pi\left(\frac{30}{7}\right)^2(6)$. Subtract and you get 100pi/3 times 9(6)-4(4) all divided by 49. 38/49.

27. A. $\frac{(x-1)^2}{9}-\frac{(y+1)^2}{4}=1$ has asymptotes $y+1=\pm\frac{2}{3}(x-1)$ and for x=0, y= $\pm\frac{2}{3}-1$ which gives sum -5/3 + -1/3 = -2

28. **B**. Take the digits two at a time: 21 base 4 is 9 base 16, and 12 base 4 is 6 base 16. Sum is 15.

29. **B**. R→ T, T→S. T→ U. By disjunctive syllogism, either R→S or R→U would be valid.

30. **D.** $C(\frac{1}{2},3)x^{-2.5}=\frac{\frac{1}{2}\bullet-\frac{1}{2}\bullet-\frac{3}{2}}{3\bullet2\bullet1}\,x^{-2.5}$