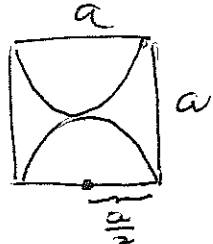


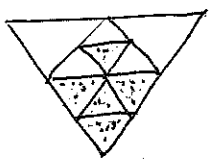
**Don Bosco Technical Institute**

**37th Annual Mathematics  
Contest**

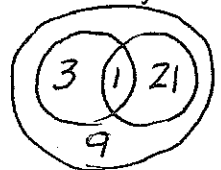
**April 25, 2009**

**Test Solutions**

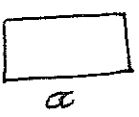
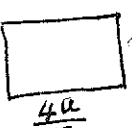
1.  Area =  $a^2 - \pi \frac{a^2}{4} = 4 - \pi$   
 $r = \frac{a}{2}$   $\frac{a^2(4 - \pi)}{4} = 4 - \pi \therefore \frac{a^2}{4} = 1$   $a = 2$  (d)  
 $\therefore p = 4a = 8$

2.  Shaded area = 5 little  $\Delta$ 's = 15 sq. ft.  $\therefore$  area of 1 little  $\Delta$  = 3 sq. ft. Unshaded area = 11  $\Delta$ 's =  $11 \times 3 = 33$  sq. ft. (e)

3. 22 squares are exposed. Area of 1 face = 9 sq. in.  
 $\therefore$  area of 22 faces =  $22 \times 9 = 198$  sq. in. (c)

4.   $30 - 9 = 21$  students speak German and/or Spanish.  
 But  $4 + 18 = 22$ .  $\therefore$  one student speaks both G & S. (a)

5. If we count 2, 12, 20 ~ 29, 32, 42, 52, 62, 72, 82, 92 — 19 #'s  
 If we count 5, 15, 25, 35, 45, 50 ~ 59, 65, 75, 85, 95 — 19 #'s  
 25 and 52 occur in both sets  
 So  $19 + 19 - 2 - 2 = 34$  numbers (a)

6.  Area =  $ab$   Area =  $\frac{4ax}{5}$   $\frac{4ax}{5} = ab$   
 $\therefore x = \frac{5b}{4} = 125\%$  of  $b$  (d)  
 $\therefore$  Width increases by 25%

7.  $\frac{40}{3} - \frac{23}{2} = \frac{80 - 69}{6} = \frac{11}{6} = \frac{15}{6}$  (c)

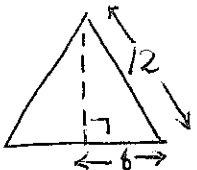
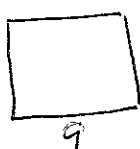
8. Small radius =  $r$ , Large radius =  $2r$   $\pi(2r)^2 - 2\pi(r)^2 = 8\pi$   
 $r^2 = 4$   $r = 2$   $\therefore$  large radius = 4 (b)

9. 10 min — 1 cup, 60 min. — 6 cups, 1 day —  $6 \times 24 = 144$  cups  
 $\frac{144}{16} = 9$  gallons (d)

10. Since  $10^3 = 1000$ , the first cube to be counted is 11  
 Since  $100^3 = 1,000,000$ , the last cube to be counted is  $99^3$   
 from 11 to 99 inclusive, there are 89 #'s (b)

11.  $3^2 = 9$ ,  $2^3 = 8$  (a) 12.  $\sqrt{\frac{1}{4}} + \sqrt{\frac{1}{25}} = \frac{1}{2} + \frac{1}{5} = \frac{7}{10}$ ,  $\sqrt{\frac{1}{4} + \frac{1}{25}} = \sqrt{\frac{29}{100}}$   
 $7 > \sqrt{29}$  (a)

13.  $d = a + b \therefore d - a = b$  (c)

14.  ht. =  $6\sqrt{3}$   
 area =  $\frac{1}{2} \text{ base} \times \text{ht}$   
 $= \frac{1}{2} \times 6 \times 6\sqrt{3} = 36\sqrt{3}$   area = 81 (b)

15. If  $x = 0$  or 1 then  $x^3 = x^2$   
 If  $0 < x < 1$  then  $x^3 < x^2$   
 If  $x < 0$  then  $x^3 < x^2$   
 If  $x > 0$  then  $x^3 > x^2$  (d)

16. If Mr. B takes 12 h, then Mr. G takes 4h and Mr. W takes 8h.

So in 6 hours, Mr. Wong does  $\frac{6}{8}$  or  $\frac{3}{4}$  of the job (d)

17. 2 pints = 1 quart, 6 pints = 3 quarts =  $\frac{3}{4}$  gallon (c)

18. Area of each square = 4 sq. in. Side of each square = 2 in.  
Perimeter of cross =  $12 \times 2 = 24$  in (a)

19.  $\sqrt{\frac{5}{3}} = \sqrt{\frac{5 \times 3}{3 \times 3}} = \frac{\sqrt{15}}{3} \doteq \frac{3.87}{3} \doteq 1.30$  (c)

20. 60 seconds — 0.8 mile, 6 seconds —  $0.08$  mile (a)

21.  $\frac{8}{100} \times 36 = \frac{72}{100} \times N$   $N = \frac{8 \times 36}{72} = 4$  (d)

22.  $\frac{x}{2} + 10 - \frac{x+10}{2} = 10 - 5 = 5$  (a)

23.  $\frac{.1 + .01 + .001}{3} = \frac{.111}{3} = 0.037$  (c)

24. Total of all 20 scores = 1680  $\frac{272}{4} = 68$  (a)  
Total of 16 remaining scores = 1408

25. average of the first 3 #s is 1 — that's the middle one  
So the numbers are -1, 1, 3,  $5, 7, 9$   $21$  (d)

26.  $\frac{1}{3} = 33\frac{1}{3}\%$  (c) 27.  $(9x)^3 = 9x^3$ ,  $729x^3 = 9x^3$ ,  $x=0$  (a)

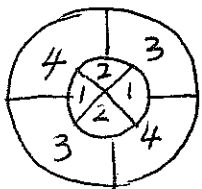
28. Each letter of the alphabet is linked to a number  
 $a=1, b=2, c=3, \dots, z=26$

truck =  $20 + 18 + 21 + 3 + 11 = 73$  (d)

29. Each term is 1 more than a perfect cube. The next term is  $5^3 + 1 = 126$  (c)

30.  $360^\circ \sim 12$  h  $\therefore 30^\circ$  per hour. 8h  $\sim 240^\circ$  (a)

31.  $\frac{1}{2}x = 12$ ,  $x = 24$ ,  $\frac{x}{3} = 8$  (c)



$4$  Colors (c)

33.  $2x + 3x + 5x = 75$ ,  $x = 7.5$ ,  $2x = 15$  (b)

34. (c) 35. product = HCF  $\times$  LCM

$2x \cdot 3x = 12 \cdot 72$ ,  $6x^2 = 864$   
 $x^2 = 144$ ,  $x = 12$

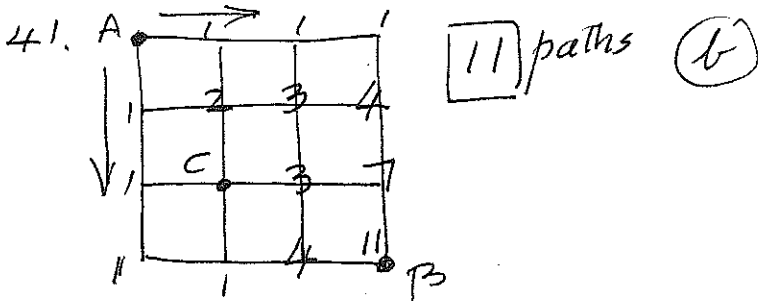
$24, 36$  (b)

36.  $14 \frac{1}{2\frac{1}{2}} = \frac{12}{5}$  (a) 37.  $12 + 6 + 2 = 20$  (d)

38.  $3c = 2p$ ,  $p = \frac{3c}{2}$ ,  $9p + 7\frac{1}{2}c = \frac{27c}{2} + \frac{15c}{2} = 21c$  (d)

39.  $\frac{\frac{2}{5} + \frac{5}{7}}{2} = \frac{\frac{14+25}{35}}{2} = \frac{39}{70}$  (d)

40.  $11111 \times 11111 = 123454321$  (5) (e)



42.  $48 - 3 = 45$   
 45 students bought p &/or e  
 $26 + 31 = 57$ . So (12) students  
 bought both (b)

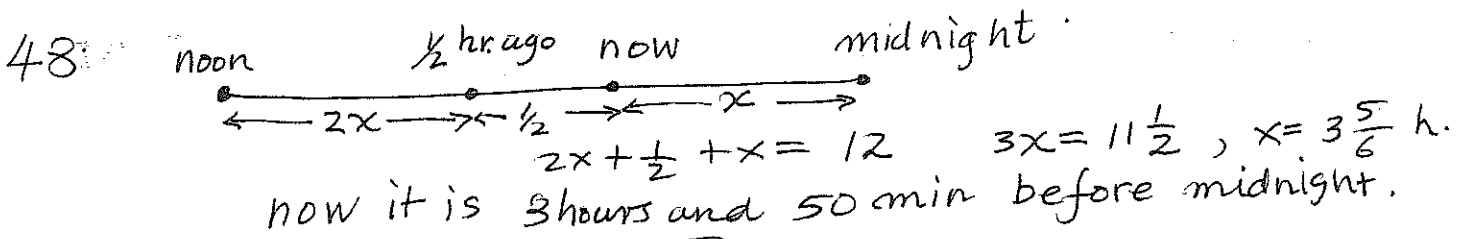
43.  $47 = 20 + 3(9)$ ,  $51 = 5(9) + 6$ ,  $59 = 3(9) + 2(6) + 20$   
 (43) cannot be so expressed (a)

44.  $\frac{x-1}{x+1} = \frac{(x+1)-2}{x+1} = \frac{x+1}{x+1} - \frac{2}{x+1} = 1 - \frac{2}{x+1}$  (< 1) (e)

45. 1, 5, 13, 29,  $29 + 32 = 61$  (b)  
 $\begin{matrix} & \rightarrow & & \rightarrow & & \rightarrow \\ 4 & 8 & 16 & 32 \end{matrix}$

46. % increase =  $\frac{10.75 - 2.50}{2.50} \times 100 = 330$  (d)

47. (18)  $1 \times 8 = 8$ , which is not a factor of 18 (c)



(8:10 p.m.) (d)

49. Whole #'s start with 0 {0, 1, 2, 3, 4, ...}  
 So between -10 and 10  
 we have 0, 1, 2, ... 9 (10 whole #'s) (d)

50.  $4 \times 5 = 20$  (b)