SA Mathematics Challenge
Wiskunde Uitdaging

MEMORANDUM 2014

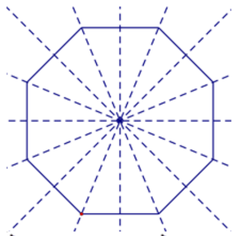
QUESTION	4(1)	4(F)	5(1)	5(F)	6(1)	6(F)	7(1)	7(F)	VRAAG
1	B	B	B	E	D	B	C	B	1
2	B	E	C	B	B	D	E	B	2
3	A	A	D	A	B	E	B	C	3
4	C	B	E	D	B	E	D	A	4
5	C	D	D	A	A	E	A	C	5
6	B	C	E	B	E	D	E	B	6
7	E	B	E	C	C	B	E	E	7
8	B	C	D	D	D	C	A	C	8
9	D	C	A	C	E	B	B	E	9
10	E	C	C	C	D	B	E	D	10
11	B	A	D	E	E	C	B	D	11
12	E	C	B	A	E	B	A	C	12
13	D	B	C	C	C	E	C	D	13
14	C	C	C	C	D	E	C	B	14
15	B	B	B	B	D	B	B	C	15
16	A	E	D	E	A	E	A	B	16
17	C	B	A	A	A	D	C	A	17
18	B	D	E	A	D	B	D	B	18
19	B	A	D	C	A	B	D	E	19
20	E	A	B	C	E	B	C	C	20
QUESTION	4(1)	4(F)	5(1)	5(F)	6(1)	6(F)	7(1)	7(F)	VRAAG

NOTES ON 2014 MEMORANDUM

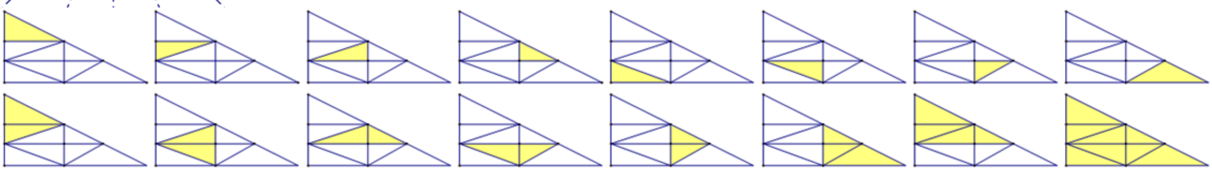
These notes are necessarily brief and often formal and symbolic.
Many questions could be answered using primitive methods, e.g. "If today is Wednesday, what day of the week will it be 100 days from now?" can be done by counting. That would be laborious, time-consuming and error-prone. The essence of a mathematical approach is to work more smartly by using appropriate representations to model the situation and to exploit the inherent structures and patterns in the situation.

GRADE 4(1)

1. B. 5 698 – 300 = 5 398
2. B. 13 – 3 + 6 – 5 + 2 – 3 = 13 + 3 – 3 − 3 = 10
3. A. 2 × 500 mL = 1000 mL = 1 litre. So from 20 litres you can fill 20×2 = 40 bottles.
4. C. 1 kg is sub-divided into 5 equal parts, so each sub-unit is 0,2 kg: 50 + 4×0,2 = 50 + 0,8 = 50,8
5. C. 73 – 68 = 5
6. B. 230 → −10 → 220 → −15 → 205 → −20 → 185 → −25 → 160
7. E. One ball costs R60 ÷ 5 = R12, so 3 balls cost 3 × R12 = R36
8. B. He has R900 − R623 − R275 = R2 left. So needs R312 − R2 = R310
9. D. Nine racks hold 9×85 = 765 oranges, so there are 785 – 765 = 20 oranges left
10. E. In 60 minutes it travels 120 km. So in 30 minutes it travels half of 120 km, which is 60 km.
11. B.



12. E.



13. D. $\frac{16}{20} < \frac{18}{20} < \frac{19}{20}$
14. C. List them systematically:

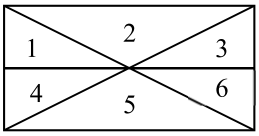
247	**4**27	**7**24
274	472	742

15. B. Four layers of 5 boxes
16. A. Look at the *structure* in the pictures! Count the number of *triangles.*
    The fourth shape is formed by 1+2+3+4 = 10 triangles, so the number of straws = 10×3 = 30

17. C. You are equally likely to draw any one of the 7+1 = 8 marbles, so $\frac{1}{8}$
18. B. $\frac{2}{5}$ of R50 is R20, so he had R30 left. $\frac{1}{6}$ of R30 is R5, so he has R30 – R5 – R25 left.
19. B. Brian is half as old as Aunt Anna, so Brian is 21 years old. Cathy is 5 years younger than Brian, so Cathy is 16 years old.
20. E. Each of the digits can be 1, 3, 5, 7 or 9, giving 5 × 5 × 5 = 125 possible combinations.

GRADE 4(F)

1. B. 1 pizza is shared between 3 children. So 12 pizzas are shared between 12×3 = 36 children
2. E. After sunset is evening, so 22:10
3. A. We have a one-digit number plus a one-digit number giving a two-digit number answer with a maximum of 9 + 9 = 18, so the first digit of the answer (OF) must be 1. So O is 1. Because O = 1, W must then be 9, otherwise W + 1 would give a one-digit (e.g. 8+1=9) and not a two-digit answer. So the sentence is 9 + 1 = 10
4. B. 20× 2 people at the two sides, plus 2 at each end, so 42 people
5. D. (64 + 96) ÷ 2 = 80
6. C. Each unit is 2 kg. So 40 kg + 2×2 kg = 44 kg
7. B. 1,7 m – 1,05 m = 0,65 m = 65 cm
8. C.

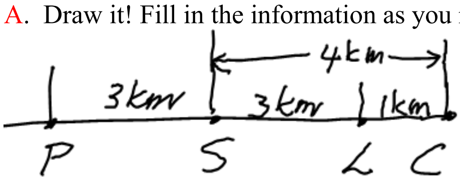


Invent some notation and count systematically, e.g.:
Areas 1, 2, 3, 4, 5 and 6 each form a triangle (6)
Two areas 1-4 and 3-6 each form a triangle (2)
Three areas 4-1-2, 2-3-6, 3-6-5 and 5-4-1each form a triangle (4)

9. C. If Zuki has ♥ marbles, Zinkle has ♥ – 15. Together they have ♥♥ – 15 = 95 marbles. So ♥♥ = 110 and ♥ = 55
10. C. With 6 loose cubes, there would be 36 faces. Subtract the 10 non-visible faces ...
11. A. The numbers must be different, so 99 + 98 + 97 = (100 – 1) + (100 – 2) + (100 – 3) = 300 – 6 = 294
12. C. A rings on the hour and half-hour. B rings at 08:00, 08:35, 09:10, 09:45, 10:20, 10:55 and 11:30
13. B 20c + 10c + 5c

    3 × 10c + 5c
14. C 102 ÷ 7 = 14 rem 4, so adding 3, we have 105 ÷ 7 = 15
15. B. $\frac{20}{36} = \frac{5}{9}$
16. E.

17. B. $\frac{1}{5} = \frac{8}{40}$ and $\frac{1}{4} = \frac{10}{40}$, so $\frac{8}{40} < \frac{9}{40} < \frac{10}{40}$, which means $\frac{1}{5} < \frac{9}{40} < \frac{1}{4}$
18. D. Name the girls a, b and c, and make a systematic list: abc bac cab
    acb bca cba
19. A. Draw it! Fill in the information as you read. Re-read, bit by bit!



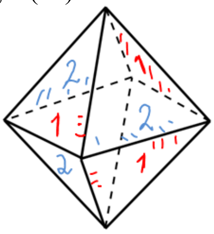
20. A. Investigate the *structure* by finding a pattern in special cases:

Row number	1	2	3	4		n
Number of triangles	1	3	5	7		$2 \times n - 1$

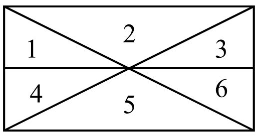
So in Row 50 there are 2×50 – 1 = 99 triangles

GRADE 5(1)

1. B. No need to calculate! (999 + 1001) + (998 + 1002) = 2×2000 = 4000
2. C. Three hours after 10:30 is 13:30
3. D. $\frac{30 \times 30 \times 30}{299+1} = \frac{30 \times 30 \times 30}{10 \times 30} = 30 \times 3 = 90$
4. E. You can do it mentally, or test on your calculator or use the rule that *the digit sum must be a multiple of 3*
5. D. Lihle is 5 years older than Musa. So Musa is 5 years younger than Lihle, so if Lihle = 35, then Musa is 5 years younger (30)
6. E.



7. E. Bring everyday knowledge that ducks have 2 legs and sheep 4 legs
Check each of them, e.g. for (A): 60×2 + 10×4 = 160 does not give 140 legs. But (E) does: 30×2 + 20×4 = 160
8. D. Buses leave at 06:06 and 06:30. So when Anna arrives at 06:40 the bust left 10 minutes ago, so the next bus leave in 14 minutes.
9. A. 99+98+97 = 294
10. C. With 6 loose cubes, there would be 36 faces. Subtract the 10 non-visible faces ...
11. D. The coin can land in 2 ways and the die in 6 ways, altogether the two together can land in 12 different ways (H, 1), (H, 2) …., (H, 6); (T, 1), (T, 2) …., (T, 6). There is only one (T, 6), so the probability is 1/12.
12. B. January has 31 days of which 16 are odd days (1, 3, 5, …,29, 31)
13. C.



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Two areas 1-4 and 3-6 each form a triangle (2)
Three areas 4-1-2, 2-3-6, 3-6-5 and 5-4-1each form a triangle (4)

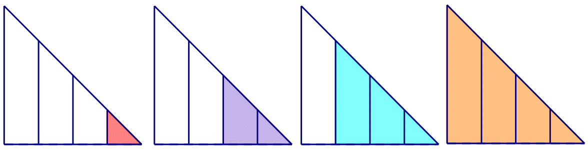
14. C. 10 + 10 + 8 + 8 = 36 or 4×10 minus the 4 corner poles that were counted twice
15. B. Make a systematic list:

24	42	72
27	47	74

16. D. Be systematic. Note structure and number patterns!
3×12 + 0×6 = 36
2×12 + 2×6 = 36
1×12 + 4×6 = 36
0×12 + 6×6 = 36
17. A. The next palindrome is 42424. So he must drive another 42424 km – 42324 km = 100 km
18. E. Work systematically!
101, 111, 121, 131, 141, 151, 161, 171, 181, 191 – this is 10
202, 212, 222, 232, 242, 252, 262, 272, 282, 292 – this is 10
….
909, 999, 929, 939, 949, 959, 969, 979, 989, 999 – this is 10
So 9×10 = 90
19. D. Look at the *structure* in the pictures!
$P_1 = 4 \times 1 + 1 = 5$
$P_2 = 4 \times 2 + 1 = 9$
$P_3 = 4 \times 3 + 1 = 13$
$P_{20} = 4 \times 20 + 1 = 81$
20. B. Make a list, varying the persons systematically. If the persons are A, B, C and D:
ABCD ACBD ADBC
ABDC ACDB ADCB
Similarly if the first person is B, C, or D.
So 4 × 6 = 24

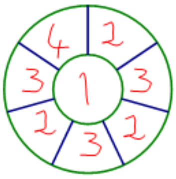
GRADE 5(F)

1. E. There are 4 different *sizes* of triangles as shown. Total = 8 + 8 + 2 + 2:



×8 ×8 ×2 ×2

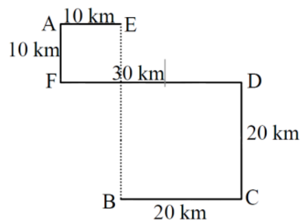
2. B.
3. A. Build a mental picture! B, E & F
4. D. A × A × A has only two digits. Trying different possibilities, only 3 × 3 × 3 or 4 × 4 × 4 can work (other values of A give a 1-digit or 3-digit number). Because BA must end with the digit A, the only correct sentence is 4 × 4 × 4 = 64
5. A. Recognize and continue with pattern:
   1st layer = 1 = 1×1
   2nd layer = 4 = 2×2
   3rd layer = 9 = 3×3
   4tht layer = 16 = 4×4
   etc…
   10th layer = 10×10 = 100 grapefruit
6. B. 12 rounds × 3 minutes/round + 11 breaks × 1 minute/break = 36 minutes + 11 minutes = 47 minutes
7. C.



8. D. 9, 18, 27, 36, … are multiples of 9, so 10, 19, 28, 37, …are 1 more than a multiple of 9. The 100th multiple of 9 is 100×9, and 1 more is 901
9. C. 1693 ÷ 9 = 188 remainder 1 (on the calculator 182.1111…). All the others leave different remainders
10. C. 6 × 3 + 2 × 4 = 26 cm
11. E. 41000 g – 725 g = 40275 g = 40,275 kg
12. A. Divide 420 into 7 equal parts:420 ÷ 7 = 60. 3 of these parts are dresses, i.e. 3 × 60 = 180
13. C. 99 m = $\frac{9}{10}$ of roll, so 11 m = $\frac{1}{10}$ of roll. Therefore $\frac{10}{10} = 10 \times \frac{1}{10}$ of role = 10 × 11 m = 110 m
14. C. Consider the possible choices from the top row:
   If I choose 1, then the options are 1, 5, 9 or 1, 6, 8 giving products 45 or 48 respectively.
   If I choose 2, the options are 2, 4, 9 or 2, 6, 7 with products 72 or 84 respectively.
   If I choose 3, the options are 3, 4, 8 or 3, 5, 7 with products 96 or 105.
   So 105 is the maximum possible product.

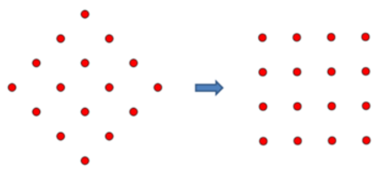
1	2	3
4	5	6
7	8	9

15. B. 3×2 + 2 =8; 7×2 + 2 = 16; so for rectangle with length 20: 20×2 + 2 = 42
16. E. Study the structure:
   4 ⊠ 3 = 16 = 4×3 + 4 = 4×4
   6 ⊠ 3 = 24 = 6×3 + 6 = 6×4
   7 ⊠ 5 = 42 = 7×5 + 7 = 7×6
   8 ⊠ 7 = 64 = 8×7 + 8 = 8×8
   So 6 ⊠ 8 = 6×9 = 54



17. A. Draw it! Fill in the information as you read. Re-read, bit by bit!
18. A. Be systematic, e.g. if the first digit is 1: 1234 1243 1324 1342 1423 1432
   Similarly if the first digit is 2 or 3 or 4. So 4 × 6 = 24
19. C. 50 × 51 = 2550
20. C. (1+2+3 + …99+100) + (1+2+3 + …99) = $\dfrac{100\times101}{2} + \dfrac{99\times100}{2} = 50\times(101+99) = 10000$

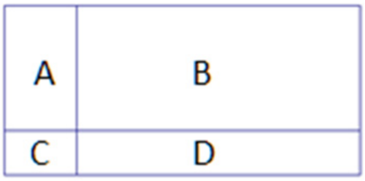
   OR, investigate special cases of the *structure:*
   1+2+1 = 4 = 2×2 = 2^2
   1+2+3+2+1 = 9 = 3×3 = 3^2
   1+2+3+4+3+2+1 = 16 = 4×4 = 4^2
   ⋮
   1 + 2 + 3 + 4 + …. 99 + 100 + 99 + …. + 4 + 3 + 2 + 1 = 100^2



GRADE 6(1)

1. D. More than halfway between 80 and 90

2. B.



Name the small rectangles A, B, C and D. List all the possibilities systematically:
One region: A, B, C, D
Two regions: AB, CD, AC, BD
Four regions: ABCD

3. B. ? → ÷9 → 2100 → ÷7 → 300 → ÷5 → 60 → ÷3 → 20

4. B. Clockwise: 1 + 5 + 1 + 1 + 4 + 4 + 5 + 1 = 22. Ant-clockwise: 5 + 5 + 6 + 6 = 22

5. A. $2\times(6+8) + 8\times(6+8) = 2\times14 + 8\times14 = 10\times14 = 140$

6. E. If the numbers are equal, they each are 138 ÷ 3 = 46. Then 45+46+47 =138

7. C. $(\frac{1}{4}+\frac{1}{12})\div 2 = \frac{1}{3}\div 2 = \frac{1}{6}$

8. D. The distance from $\frac{1}{3}$ to each of the fractions are $\frac{1}{6}$, $\frac{1}{120}$, $\frac{1}{60}$, $\frac{1}{270}$ and $\frac{1}{39}$, of which $\frac{1}{270}$ is the smallest

9. E. From the first two equations A = 15 and B = 2, or A = 2 and B =15. But from the third equation B cannot be 15, so B = 2, and then 2 + C = 13, so C = 11

10. D. The first three may be blue, red and brown. Then the next one must match one of these colours

11. E. You can maybe take out, e.g. 10 red, then 10 brown, then 1 blue, then the next one must also blue

12. E. Replace the 5 numbers with 20, 20, 10, 10, 30. Then only 20+20+30 = 70.

13. C. ¼ of the balls sold are cricket balls, so the total number of balls sold are 4×60 = 240. If x rugby balls are sold, then $5x$ soccer balls were sold, Then $x + 5x + 60 = 240$, $x = 30$, and $5x = 150$.

14. D. $\Delta MDN = \frac{1}{8}$ of square and $\Delta BCN = \frac{1}{4}$ of square. So $ABNM = 1 - \frac{1}{8} - \frac{1}{4} = \frac{5}{8}$ of square

15. D. Investigate the *structure* by finding a pattern in special cases:

Number of cuts	0	1	2	3		n
Number of pieces	1	3	5	7		$2\times n + 1$

Therefore, there will be 2x9 + 1=19 pieces of string

16. A. 147 = 12×12 + 3, but 122= 11×11 +1, 102 = 10×10 + 2, 81 = 9×9 + 0, 401 = 20×20 +1

17. A. Think of green-amber-red as a repeating block of 3. Up to 99 this block is repeated 33 times, and then the next flash is green, so there are 34 greens.

18. D. Let the children be A, B, C and D. List all the possibilities systematically. Note that a child cannot play against itself, and order does not matter, i.e. A vs B is the same as B vs A:

A vs B	**B** vs C	**C** vs D	**D** vs E
A vs C	B vs D	C vs E	
A vs D			

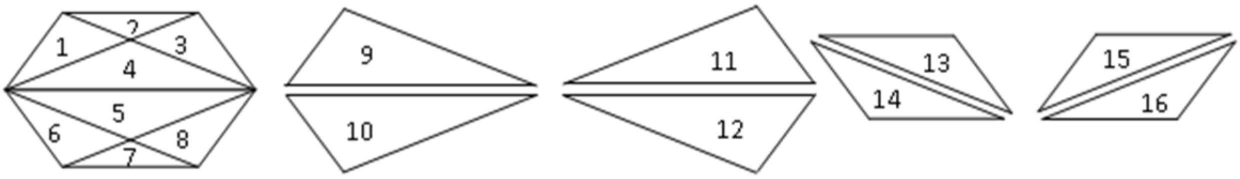
19. A. Be systematic:

1	6 = 4+2	11 = 8+2+1
2	7 = 4+2+1	12 = 8+4
3 = 2+1	8	13 = 8+4+1
4	9 = 8+1	14 = 8+4+2
5 = 4+1	10 = 8+2	15 = 8+4+2+1

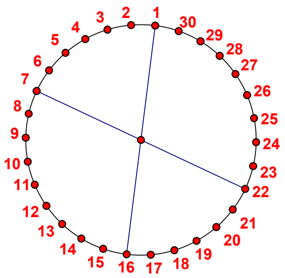
20. E.
$U_1 = 1 + 3 + 4$
$U_2 = 2 + 4 + 5$
$U_3 = 3 + 5 + 6$
$U_{80} = 80 + 82 + 83 = 245$

GRADE 6(F)

1. B. If the smallest number is x, then $x + (x+1) + (x+2) = 174$, so $3x+3= 174$, so $x = 57$ and $x+2 = 59$
2. D. I must be a single-digit number divisible by 2 and 3. So I must be 6 (and P = 2 and G = 3)
3. E. In 1 hour it travels 120 km, so in ½ hour it travels 60 km
4. E.



5. E. 1, 2, 4, 5, 10, 20, 25, 50, 100
6. D. The unit is 0,02. So 4,1 – 0,2 = 4,08
7. B. The rule is “halve”, so $\frac{1}{2}$ of $(1 + \frac{1}{2}) = \frac{1}{2}$ of $1 + \frac{1}{2}$ of $\frac{1}{2} = \frac{1}{2} + \frac{1}{4} = \frac{3}{4}$
8. C. 5 out of 100 = 5% of bulbs were defective. So 5% of 3000 = 150 bulbs may be defective
9. B. Draw it! 1 is opposite 16, 2 opposite 17, …. 7 opposite 22



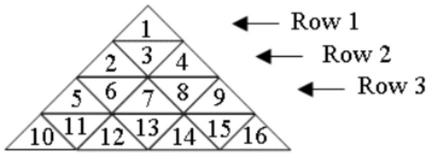
10. B. From half to full in 1 minute , so 59 minutes
11. C. 4 books = 2 books + 6 kg, so 2 books = 6 kg, so 1 book = 3 k
12. B. $\frac{1}{2} + \frac{1}{8} + \frac{1}{8} = \frac{3}{4}$; R15 is $\frac{1}{4}$; R60 = $\frac{4}{4}$
13. E. 230 – 60 = 170; 170 ÷ 2 = R85
14. E. 18 = 12 + 6 = 12 + ½ of 12. So $\frac{2}{3} +$ ½ of $\frac{2}{3} = \frac{2}{3} + \frac{1}{3} = 1$
15. B. Trial and improvement: 30×31 = 930 is too small …. 35 × 36 = 1260 is too small …. 36 × 37 = 1332
16. E. ½ of 3×3 cm^2 + 3×3 cm^2 + ½ of 3×1 cm^2 = 4, 5 cm^2 + 9 cm^2 + 1,5 cm^2 = 15 cm^2
17. D. Make a list, varying the persons systematically. If the persons are A, B, C and D:
    ABCD ACBD ADBC
    ABDC ACDB ADCB
    Similarly if the first person is B or C, or D.
    So 4 × 6 = 24
18. B. Through systematic elimination, e.g.
    A in the top row must be 1, 8 or 6. But A in the right column cannot be 8 or 1, so A is 6
    B in the bottom row must be 9, 4 or 2. But A in the right column cannot be 9 or 4, so B is 2
    C in the top row must be 1 or 8. But C in the left column cannot be 1, so C is 8. So E is 1
    D in the bottom row must be 9 or 4. But D in the left column cannot be 4, so D is 9. So F is 4
    We only have 3, 5 and 7 left. But G cannot be 3 or 7, so G = 5. H cannot be 3, so H = 7 and X = 3

C	E	A
G	X	H
D	F	B

19. B. 16 out of 24 marbles are not blue, so the probability of choosing a not-blue marble is $\frac{16}{24} = \frac{2}{3}$
20. B. 1, 4, 9, … = 1×1, 2×2, 3×3, … 20×20

GRADE 7(1)

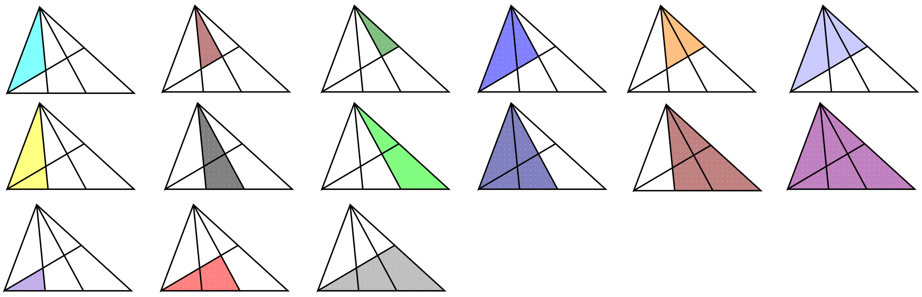
1. C. $2 - 2 \div 2 + 2 = 2 - 1 + 2 = 3$
2 E. Sum of 4 consecutive numbers is 26, i.e. 5+6+7+8. Therefore, Mon is the 5^{t}
3. B. Each hour is equivalent to 30^o, thus the four hours between 08:00 and 12:00 is equivalent to 4×30^o
4. D. Investigate the *structure* by finding a pattern in special cases:



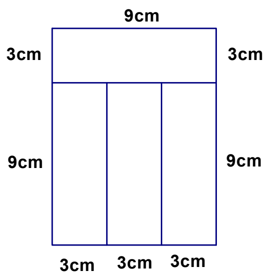
Row number	1	2	3	4		n
Number of numbers	1	3	5	7		$2\times n - 1$

Therefore, there will be $2x20 - 1$=39 numbers in Row 20

5. A. The last number in each Row is the sequence 1, 4, 9, 16, ………n^2
The last number in Row 19 is 19×19. So the first number in Row 20 is 19×19 + 1 = 362
6. E.



7. E. $1 + \frac{1}{1+\frac{1}{3}} = 1 + \frac{1}{\frac{4}{3}} = 1 + \frac{3}{4} = 1\frac{3}{4}$
8. A. $\frac{60\ km}{1\ h} = \frac{60\ 000\ m}{3600\ sec} = \frac{600\ m}{36\ sec} = \frac{200\ m}{12\ sec}$
9. B.



10. E. X567Y is a multiple of 3, and 5+6+7 = 18 is a multiple of 3, so X+Y must be a multiple of 3. So the largest value of Y is 9, e.g. 3+9, 6+9, 9+9.
11. B. Use trial and improvement:
$20 \times 6 - 0 \times 2 = 120 \neq 88$ *He did not have all correct*
$19 \times 6 - 1 \times 2 = 112 \neq 88$ *He did not have 19 correct*
$17 \times 6 - 3 \times 2 = 96 \neq 88$ *He did not have 17 correct*
$16 \times 6 - 4 \times 2 = 88$ *He had 16 correct!*
12. A. $3x - 5 = 25$, so $x = 10$
13. C. Structure!

P_1	P_2	P_3	P_4	…	P_{50}
1×2	2×3	3×4	4×5	…	?

14. C. Difference in mass of water when half full and one third full:
$\frac{1}{2} - \frac{1}{3} \equiv 12 - 10$ kg, so $\frac{1}{6} \equiv 2$ kg
Thus, when half full, the water will be 6 kg, which means that the bucket has a mass of 6 kg.
15. B. The sum of the five numbers is a + b + c + d + e = 60 × 5 = 300
The new sum is 80 + b + c + d + e = 65 × 5 = 325
So 80 − a = 25, so a = 55
16. A. $\frac{20!}{19!} = \frac{20\times19\times18\times\ldots\ldots\times1}{19\times18\times\ldots\ldots\ldots\times1} = 20$
17. C. Note that the numbers is column G are multiples of 7, in column F are all one less than a multiple of 7, etc. 2014 is 2 less than a multiple of 7 (2014 = 287 × 7 + 2), so 2014 will be in column E, which are all 2 less than a multiple of 7 (5, 12, 19…)

18. D. 4 choc + 2 cool = R35
2 choc + 4 cool = R43
6 choc + 6 cool = R78
1 choc + 1 cool = R13

19. D. The total number of dots that are not visible = total dots − visible dots
The total of the numbers on one die = 1+2+3+4+5+6 = 21, so the total on the three dice is 63.
Numbers 1, 1, 2, 3, 4, 5, 6 are visible, and these total 22.
So the total dots *not* visible = 63 − 22 = 41

20. C. Suppose there are 100 people

	Sick	Well
Month 1	10	90
Month 2	3+27=30	7+63=70

So $\frac{30}{100}$ of the people is sick

GRADE 7(F)

1. B. The number of girls and boy comprises 7 parts. Girls are 4 parts. So number of girls = $\frac{4}{7} \times 168 = 96$
2 B. We know that $c - a = d - b = 7$ so $c - a = d - b$. So $a + d = b + c$
3. C. $\#\,matches = 2 \times \#\,triangles + 1$. So for 30 triangles: $2 \times 30 + 1 = 61$
4. A. 40 heads means that there are 40 animals altogether. If 20 were sheep then there will be 80 legs. The other 20 will be ducks so there will be 40 legs. So 80 + 40 = 120 legs; which is 4 too few. We need 4 more legs which means there should be more sheep than ducks. If 22 were sheep then there would be 88 legs. Now 124 – 88 = 36. So there should be 18 ducks (and 22 + 18 = 40)
5. C. Note that $1 + 2 = 3$; $1 + 2 + 3 = 6$; $1 + 2 + 3 + 4 = 10$
   So $n = 1 + 2 + 3 + 4 + 5 + \ldots + 10 = 55$
6. B. Area of shaded region = Area of ΔABD – Area ΔAEF
   $= \frac{1}{2} \times 8 \text{ cm} \times 6 \text{ cm} - \frac{1}{2} \times 4 \text{ cm} \times 3 \text{ cm}$
   $= 24 \text{ cm}^2 - 6 \text{ cm}^2$
   $= 18 \text{ cm}^2$
7. E. If 5 numbers have an average of 60, then the sum of these numbers is 300. If 4 numbers have an average of 50, then the sum of the numbers is 200. The difference is 100. This means that Joe erased the number 100
8. C. Note that column G consists of multiples of 7. If we divide 500 by 7 we get 71 remainder 3. So 497 will be in column G, 498 will be in column A, 499 in column B and 500 in column C
9. E. The following six products are possible: 2×5; 2×7; 2×8; 5×7; 5×8; 7×8.
   All of these products are even with the exception of 5×7, so 5 out of 6 products are even
10. D. Each team will play 7 other teams (a team cannot play against itself), so each team plays 7 matches. However, this is done twice (home and away). So each team will play 14 matches.
11. D. Check 2-digit primes less than 50: 11; 13; 17; 19; 23; 29; 31; 37; 41; 43; 47
    Reverse the digits: 11; 31; 71; 91; 32; 92; 13; 73; 14; 34; 74. Of these 11; 13; 31; 71; 73 are also prime
12. C. Odd numbers less than 10 are 1; 3; 5; 7; 9. The only possibilities are 1 + 9 = 10; 3 + 7 = 10: 5 + 5 = 10
13. D. Make a systematic list, e.g. 3579; 3597 | 3759; 3795 | 3957; 3975 | 9375; 9357 | 9537 …
    Or: He has 4 choices for the first number, then 3 choices for the second, 2 for the third and 1 for the fourth.
    So $4 \times 3 \times 2 \times 1$
14. B. Suppose the number on the left bottom corner is N. We know that $9 + 4 + N = N + 10 + x$ (property of magic square). So $x = 3$
15. C. Andile has R2 more than what he started with. Thus, if David has won 4 games, then Andile has won 4 + 2 = 6 games to give him a net win of R2 (since he has R2 more than what he started with). Thus, the total number of games is 4 + 6 = 10
16. B. 1 cm represents 8 km so $(1\text{cm})^2$ represents $(8 \text{ km})^2$; that is 1 cm^2 represents 64 km^2 on the map. So 240 cm^2 would represent $240 \times 64 \text{ km}^2 = 15360 \text{ km}^2$
17. A. 45 minutes = ¾ hours.
    In ¾ hours, Paul travels 72 × ¾ km = 54 km
    In ¾ hours Peter travels 80 × ¾ km = 60 km
    The total distance between the two towns is the total distance travelled by the brothers:54 km + 60 km = 114 km
18. B. Make a systematic representation of all possible cases, e.g. a table like this:

DIE 1

DIE 2	1	2	3	4	5	6
1	1; 1	1;2	1;3	1;4	1;5	1;6
2	2; 1	2;2	2;3	2;4	2;5	2;6
3	3; 1	3;2	3;3	3;4	3;5	3;6
4	4; 1	4;2	4;3	4;4	4;5	4;6
5	5; 1	5;2	5;3	5;4	5;5	5;6
6	6; 1	6;2	6;3	6;4	6;5	6;6

We can count which ones have a sum less than 9: 6 + 6 + 5 + 4+ 3 + 2 = 26

19. E. Make a systematic list all possible cases: BBB, BBG, BGM, BGG
    GBB, GBG, GGB, GGG
    In 7 out of the 8 possible cases there is at least one girl (all except for GGG)
20. C. The figure contains 1+3+5+7+5+3+1 = 25 squares of size 2 cm by 2 cm. The area = $25 \times 4 \text{ cm}^2 = 100 \text{ cm}^2$