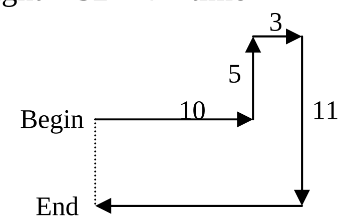
NOTES ON MEMORANDUM

These notes are necessarily brief and often formal and symbolic.

GRADE 4(1)

1. $(64 + 96) \div 2 = 80$
3. $5 = \nabla - 8$, so $\nabla = 13$
4. $72c \times 4 = R2{,}88$
5. 3✿ $= \heartsuit$, so 6✿ $= 2\heartsuit$, so $X = 2\heartsuit = 4\,\Delta$
6. $102 \div 7 = 14$ and $15 \times 7 = 105$, so 3 more marbles are needed
7. 6×10 or $10 \times 6 = 60$
8. $18 \times 10 = 180$
9. Make *equal parts*, e.g. 16 *triangles*, then 8 of 16 triangles = 1/2 of whole figure is shaded
   Or 8 *squares* with 1/2 of each square shaded, so 1/2 of whole figure is shaded
10. 6 small ones and 2 big ones for a total of 8
11. $6 \times R0{,}75 - 2 \times R2 = 50c$
12. $08{:}00 - 70$ min $\rightarrow 06{:}50$
13. 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
14. If Mary has x stamps, Jason has $2x$, so $x + 2x = 3x = 96$, so $x = 32$
15. Make a sketch: **A … 15 …Stall …… ? ……..B** So 15 + ? = 75
16. The pattern is 1 + **1** + 1 + **2** + 1 + **3** + 1 + **4** + 1 **+ [5** + 1 **+ 6** + 1 **+ 5]** + **2** + 1 + **8** + 1. So 18 in box!
17. Continue pattern of subtracting 4 cm/hour. Or the formula is: Height = $32 - 4 \times$ time
18. $3 + 8 + 3 + 8 = 22$
19. Between $\frac{1}{2}$ and $\frac{3}{4}$ (i.e. about $\frac{5}{8}$ of circle is shaded. So C.
20. Draw it physically, as shown to the right!
21. Imagine yourself positioned to the left behind the building
    and describe what you see …



22.

	96000		
	160	**600**	
8	**20**	**30**	
2	**4**	**5**	**6**

23. For 6 milktarts she needs 8 cups of milk, so for 8 ($6 + 2 = 6 + \frac{1}{3}$ of 6) milktarts she needs

    $8 + \frac{1}{3}$ of $8 = 8 + \frac{1}{3}$ of $(6 + 2) = 8 + \frac{1}{3}$ of $6 + \frac{1}{3}$ of $2 = 8 + 2 + \frac{2}{3} = 10\frac{2}{3}$ cups of milk

24. With 15 eggs you can make the recipe $1\frac{2}{3}$ times. $6 \times 1\frac{2}{3} = 10$ milktarts
25. Be systematic, e.g.

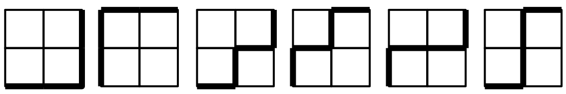
32	23	43	13
34	24	42	12
31	21	41	14

GRADE 4(F)

3. The watch gains 2 minutes every day for 7 days = 14 minutes
4. $7 + 8 = 15$. So Sizwe caught 7 fish
7. If Zuki has ♥ marbles, Zinkle has ♥ – 15. Together they have 2×♥ – 15 = 90 marbles. So ♥ = 55
8. $257 + \Delta = 438$, so $\Delta = 438 - 257 = 181$ km
9. $438 + 169 = 607$ km
10. If 12 bottles cost R30, 4 bottles cost R10, and 8 bottles cost R20
12. Half of the previous number $= 1{,}7 \div 2 = 0{,}85$

13. 37 will be opposite 38, therefore Con lives opposite Luke
14. Delshe has 71 + 24, Therine has 71 – 24. In total they have 71+24 + 71 + 71–24 = 71 × 3 = 213
15. R35,60 ÷ 40 = 0,89; 0,89 × 15 = R13,35
16. **4** × 3 → 12 + 8 → 20 ÷ 2 → 10 – 6 → **4**
17. $\frac{3}{4} + \frac{3}{4} \rightarrow 1\frac{1}{2} + \frac{3}{4} \rightarrow 2\frac{1}{4} + \frac{3}{4} \rightarrow 3 + \frac{3}{4} \rightarrow 3\frac{3}{4} + \frac{3}{4} \rightarrow 4\frac{1}{2}$
    ① ② ③ ④ ⑤ ⑥
18. $2\frac{1}{5} + 2\frac{1}{5} + 2\frac{1}{5}$ + … 15 times; 15 × 2 = 30; 15 × $\frac{1}{5}$ = 3; 30 + 3 = 33
20. List all the possibilities and be systematic:

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

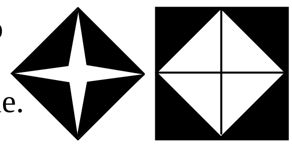
    Any other combination will be a repetition – therefore 11 possible answers
21. Eby, Ram, Temba, Siva, Oscar – from tallest to shortest
22. 
23. Let the children be 1, 2, 3, 4 and 5. List all the possibilities and be systematic:

1 vs 2	2 vs 3	3 vs 4	4 vs 5
1 vs 3	2 vs 4	3 vs 5	
1 vs 4	2 vs 5		
1 vs 5			

24. There are 36 tiles. 20 tiles are not covered (count halves). $\frac{20}{36} = \frac{5}{9}$
25. 1; 4; 9; 16; … = 1 × 1; 2 × 2; 3 × 3; 4 × 4; … So 20 × 20 = 400

GRADE 5(1)

1. 11,23 < 11,32 < 11,4 So Peter Davids is third
2. The watch gains 4 × 30 s = 2 minutes in one day, so 14 minutes in 7 days
4. B: Fold the black triangles into the white square … they will fit exactly. So the black and white areas are equal, so the black area is 1/2 of the whole.
    Or, if you see 4 squares, them 1/2 of each square is shaded, i.e. 1/2 of whole.
    Or, cut the figure into equal triangles, then 4/8 = 1/2 triangles are shaded



5. It is not @, *, # or X, so it is T
6. 12 chocolates weigh 1,1 kg – 680 g = 420 g, so 1 chocolate weighs 420 g ÷ 12 = 35 g
    so 30 chocolates weigh 30 × 35 g = 1050 g, so box weighs 1100 g – 1050 g = 50 g
7. Each number (except the first) is the previous number multiplied by 3
8. Test each of the given answers … Or: If the number is N, then N – 1 is divisible by 3, 5 and 6
    The smallest number divisible by 6 is N – 1 = 3 × 5 × 2 Why?? So N – 1 = 30, so N =31
9. Test each of the given answers …
    Or, find a (Susie's marbles) and b (Sam's) through trial and check so that $a + b = 105$ and $b - a = 25$
    Or, if Sam has b marbles, $(b - 25) + b = 105$, so $2 \times b - 25 = 105$, so $b = (105 + 25) \div 2 = 65$
    Or, to do *equal* sharing, lend 25 marbles to Susie. Then, together they have 105 + 25 = 130, so they each have 130 ÷ 2 = 65. Now Susie must give back the extra 25 marbles we lent her!
11. Start numbering (painting) the sides …
12. If their ages are a, b, c and d, then $(a + 10) + (b + 10) + (c + 10) + (d + 10) = 100$, so $a + b + c + d = 60$
13. Draw equal triangles, then 4 out of 14 triangles are shaded
14. If C children like chocolate, then $4 + 2 \times C = 40$, so $C = (40 - 4) \div 2 = 18$
15. If Joe's starting number is S, then he did $S \times 10 = 9000$. So $S = 900$. So correct answer is 900 ÷ 10 = 90
16. List them systematically:
    1, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
    21, 31, 41, 51, 61, 71, 81, 91 and 100

17. Make a sketch of the situation:
"2nd from front, 4th from back" means there are 5 rows. "3rd from left, 5th from right" means there are 7 students per row. So 7 students/row $\times$ 5 rows = 35 students

18. $\frac{1}{8}$ of (3×90c) = 270c $\div$ 8 $\approx$ 34c

19.

pattern no	1	2	3	…	50
no coins	1 + 2	2 + 4	3 + 6	…	50 + 100 = 150

pattern no	1	2	3	…	50
no coins	1×3	2×3	3×3	…	$50 \times 3 = 150$

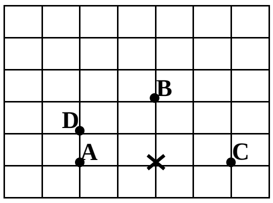
20. List them systematically: 997; 988; 979 898; 889 799

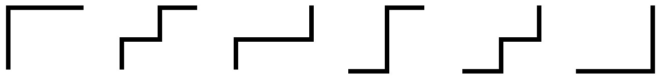
21. 2002 is the only one in the century 2000 – 2100

22. Investigate systematically, e.g. 8 = 5 + 2 + 1; 9 = 5 + 2 +2; 11 = 10 + 1; 12 = 10 + 2; 13 = 10 + 2 + 1; 14 = 10 + 2 +2, 15 = 10 + 5; 16 = 10 + 5 + 1; 17 = 10 + 5 + 2; 18 = ??

24. Try different possibilities. The one at X below is the shortest (2 + 2 + 2)

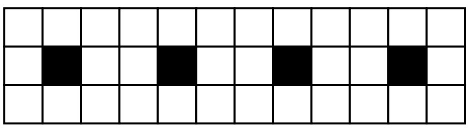
25. Be systematic, as shown below right:





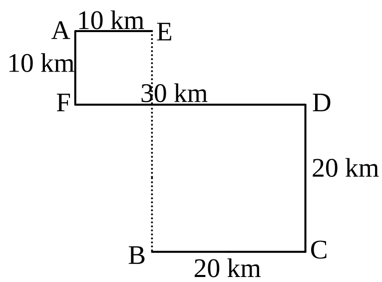
GRADE 5(F)

1. $8 \times 4 \times 2 = 64$
2. These are multiples of 6, they are all even, So it cannot be A. Test the others by division, use your calculator! 3526 $\div$6 = 587,6 … 4182 $\div$6 = 697
3. The trip is 31 min, therefor 12:30 + 31 min $\rightarrow$ 13:01
4. 500 $\div$ 12 = 41,6667. Therefor 42 boxes
5. The photo is enlarged 3 times. $22 \times 3 = 66$ mm
6. If the loser had Δ votes, the winner had Δ + 1002 votes. Together $2\times\Delta + 1002 = 39218$
7. $\frac{30}{200} = \frac{3}{20}$
8. R5 less for you and R5 more for her = R10
9. 274 – 245 = 29
11. If his mass is m, then m + 0,725 kg = 41 kg, so m = 40,275 kg
12. 5 litres + 1 litre = 6 litres; 6×5 = 30 litres; 5×5 = 25 litres
14. 99 m = $\frac{9}{10}$, so 11 m = $\frac{1}{10}$. Therefore $\frac{10}{10}$ = 10×11 = 110 m
16.



$\frac{4}{36} = \frac{1}{9}$

17. $6 \times 8 \rightarrow 48 + 8 \rightarrow 56$
18. 5 + 3 + 3 + 3 + … = 44. So 44 – 5 = 39; 39 $\div$ 3 = 13; 13 + 1 = 14
19. 5 + 8 + 11 + 14 + 17 + 20 + 23 + 26 + 29 + 32 + 35 + 38 + 41 +44 = 49×7 = 343
20. Draw it!
Fill in the information as you read
Re-read, bit by bit!



21. man: 2 km after 30 min, 6 km after $1\frac{1}{2}$ hours
wife: 0 km after 30 min, 6 km after $1\frac{1}{2}$ hours

22. man walks 0,4 km every 6 min, wife walks 0,6 km every 6 min
man walks 1,2 km every 18 min, wife walks 1,8 km every 18 min

$$\begin{array}{cccccccccc} A & \rightarrow & \rightarrow & \rightarrow & \rightarrow & \longleftarrow & \longleftarrow & \longleftarrow & \longleftarrow & B \\ & 1{,}2 & 2{,}4 & 3{,}6 & 4{,}8 & 7{,}2 & 5{,}4 & 3{,}6 & 1{,}8 & \end{array}$$

24. R11,50 × 5 = R57,50; R57,50 – R11,50 – R11,50 = R34,50

25. 1 + 2 + 3 + 4+ 5 + 6 + … + 47 + 48 + 49 + 50
= 51 + 51 + 51 + … 25 times (compare no 19!)
= 51 × 25
= 1275

<u>GRADE 6(1)</u>

1. 8 – 7,93 = 0,07 < 8,08 – 8 = 0,08
2. 1Δ = 6□ and 1Δ + 1☺ = 10□. So 1☺ = 4 □ and 2☺ = 8 □
3. $\frac{13}{20}$ is more than $\frac{12}{20}$ ($\frac{3}{5}$) and less than $\frac{16}{20}$ ($\frac{4}{5}$), so he is on side DE
4. He still has $\frac{7}{20}$ of the distance to go, so $\frac{7}{20}$ of 25 cm = (25 cm ÷ 20) × 7 = 8,75 cm
5. The pattern is ÷ 6; ÷ 7; ÷ 8; ÷ 9; …
6. From the ground, over the length, to the ground again is 6m + 8m + 6m = 20m, and from the ground, over the width, to the ground again is 6m + 10m + 6m = 22m
7. Use trial and error …, or:
$$\frac{3x+8}{2} - 6 = x$$
$$\therefore 3x + 8 = 2(x+6)$$
$$\therefore x = 4$$
8. 17 + 18 + 19 = 54, so their product is 17 × 18 × 19 = 5814
9. $\frac{8}{11} - \frac{5}{8} = \frac{9}{88}$ and $\frac{9}{88}$ = 135 litres, so $\frac{1}{88}$ = 135 ÷ 9 = 15 litres, so $\frac{88}{88}$ = 15 × 88 = 1320 litres
10. 4 books = 2 books + 6 kg, so 2 books = 6 kg, so 1 book = 3 kg
11. There is a general structure here: The denominators is twice the numerator + 1, i.e. $\frac{\lozenge}{2\times\lozenge+1}$
We can therefore investigate a general pattern $\frac{1}{3}$, $\frac{2}{5}$, $\frac{3}{7}$, $\frac{4}{9}$, $\frac{5}{11}$, $\frac{6}{13}$, $\frac{7}{15}$, …
Check with your calculator: $\frac{1}{3}$ = 0, 333..., $\frac{2}{5}$ = 0,4, … So $\frac{1}{3} < \frac{2}{5} < \frac{3}{7} < \frac{4}{9} < \frac{5}{11} < \frac{6}{13} < \frac{7}{15} < \ldots$
Conclusion: the larger the denominator, the larger this kind of fraction, so $\frac{11}{23}$ is the largest
12. The gap will close at 8 mm/100 years. They have to grow 15 000 mm altogether. Therefore:
15 000 mm ÷ 8 mm/100 years = 15 000 × $\frac{100}{8}$ = 187 500 years
13. Check all cases and note pattern: 1 × 17 =17; 2 × 16 = 32; 3 × 15 = 45; 4 × 14 = 56; … 9 × 9 = 81
14. Length = 15 + 2×Mass, so Length (15) = 15 + 2×15 = 45
16. James is now 2 × 5 = 10 years old, so 15 years from now he will be 10 + 15 = 25 years old.
17. Make a systematic list, e.g. 3579; 3597 | 3759; 3795 | 3957; 3975 | 9375; 9357 | 9537 …
19. If the empty glass has a mass of *g* gram and milk *m* gram, then *g* + *m* = 370 and *g* + $\frac{1}{2}$ *m* = 290.
So $\frac{1}{2}$ *m* = 370 – 290 = 80 grams, so *m* = 160 grams and *g* = 370 – 160 = 210 grams
20. $\frac{2002+2001}{2002-2001} = \frac{4003}{1}$ = 4003

21. Let c be the cost of a coke and d the cost of a packet of chips. The cost of the first buy is $6c + 7d$ and of the second is $8c + 4d$. So you bought 2 Cokes more, but 3 chips less, so 2 Cokes cost just as much as 3 packets of chips (compare the sentence $6c + 7d = 8c + 4d$). So instead of $8c + 4d = 4 \times 2c + 4d = 4 \times 3d + 4d = 12d + 4d = 16d$
22. Suppose he eats x bananas in the last hour, then $(x + 15) + (x + 10) + (x + 5) + x = 90$
    So $4x + 30 = 90$, so $x = 15$ bananas
23. There are 5 possible first digits (1, 3, 5, 7, 9) and 5 possible second digits, so in total $5 \times 5 = 25$
24. Let the cost of eggs be Re, chips Rc, etc.

$e + c =$ R4,90 ……..…E_1
$s + c =$ R6,00 ………. E_2
$s + m =$ R5,70 ………. E_3
$E_1 - E_2$: $e - s = -$R1,10 ….…. E_4
$E_3 + E_4$: $m + e =$ R4,60

or

$E_1 + E_2 + E_3$:
$e + 2s + 2c + m = 16{,}60$
$\therefore\ e + 2(s + c) + m = 16{,}60$
From E_2: $e + 2 \times 6 + m = 16{,}60$
$\therefore\ e + m =$ R4,60

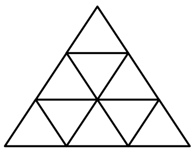
25. For any two numbers a and b, the operation * is $a * b = (a \times b) + (a + b)$

GRADE 6(F)

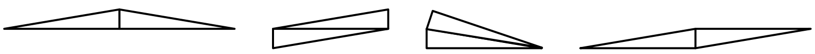
1. 365 days ÷ 7days/week = 52 weeks and 1 day …

2003 Thu	2008 Thu (Leap year!)
2004 Sat (Leap year!)	2009 Fri
2005 Sun	2010 Sat
2006 Mon	2011 Sun
2007 Tue	2012 Tue (Leap year!)

2. $5{,}6 + 5{,}65 \rightarrow 11{,}25 \div 2 \rightarrow 5{,}625$
5. $4653 - 2583 = 2070$; $2070 \div 90 = 23$
6.



8. $\frac{5}{6} = \frac{40}{48}$ and $\frac{7}{8} = \frac{42}{48}$ $\therefore \frac{41}{48}$
9. From half to full in 1 minute $\therefore$ 59 minutes
11. About 8,6 in 1 hour ($60 \div 7 = 8{,}57142$)
    About 206 in 1 day ($8{,}6 \times 24 = 206{,}4$)
    About 75 000 in 1 year ($206 \times 365 = 75190$)
12. $\frac{1}{2} + \frac{1}{8} + \frac{1}{8} = \frac{3}{4}$; R15 is $\frac{1}{4}$; R60 = $\frac{4}{4}$
13. If the book costs Rx, the CD costs R$x + 60$. Together they cost $x + x + 60 = 230$
    So $x = (230 - 60) \div 2 =$ R85
14. See Grade 4(1) number 11
15. $43 = 8 \times 5 + 3$; $78 = 10 \times 7 + 5 + 3$; $56 = 8 \times 7$; $47 = 6 \times 7 + 5$. So all are possible
16. Jane eats 24 sweets in 5 minutes and 48 sweets in 10 minutes.
17. $41 + 35 - 30 = 46$; $50 - 46 = 4$
18.



19. The tiger is the fastest, so A. The elephant is the heaviest, so C. The cat is the slowest and lightest, so E. The man is not as fast as the horse, and is lighter than the horse, so D is the man.
20. $4 \times 1\frac{1}{2} = 6$ cm; $6 \times 1\frac{1}{2} = 9$ cm

21. 11, 22, 33, 44, 55, 66, 77, 88, 99, (9)
101, 111, 121, 131, 141, 151, 161, 171, 181, 191, (10)
202, 212, 222, 232, 242, 252, 262, 272, 282, 292, (10)
303, etc. (10)
404, etc. (10)
So the total is 49

22. Make a table of the data, find a pattern and use the pattern to predict the answer:

Row number	**Number of triangles**
1	$1 = 2 \times 1 - 1$
2	$3 = 2 \times 2 - 1$
3	$5 = 2 \times 3 - 1$
4	$7 = 2 \times 4 - 1$
50	$2 \times 50 - 1 = 99$

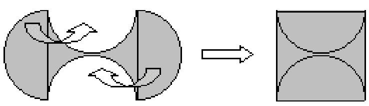
23. Look systematically at special cases and find a pattern:
Total triangles in 1 row = 1
Total triangles in 2 rows = $1 + 3 = 4 = 2^2$
Total triangles in 3 rows = $1 + 3 + 5 = 9 = 3^2$
Total triangles in 4 rows = $1 + 3 + 5 + 7 = 16 = 4^2$
So, total triangles in 50 rows = $50^2 = 50 \times 50 = 2\,500$

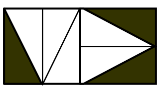
24. It really is the same question as 23 – the numbers and the number of triangles are the same!
So $15^2 = 15 \times 15 = 225$

25. The pattern is 1×2, 2×3, 3×4, 4×5, … So $50 \times 51 = 2550$

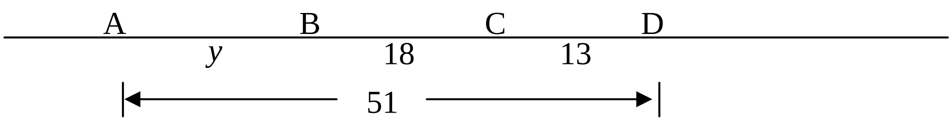
GRADE 7(1)

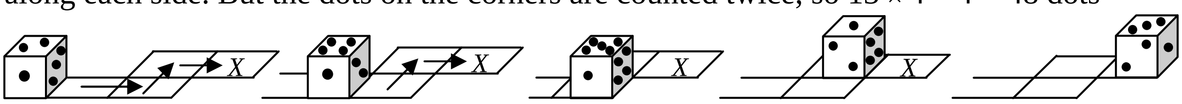
1. E: $4 + 4 - 4 \div 4 = 8 - 1 = 7 \neq 1$

2.  So $6 \text{ cm} \times 6 \text{ cm} = 36 \text{ cm}^2$

4. 

6. 10 out of 100 pears are not sold. So 550 out of 5500 are not sold
7. The Fibonacci sequence: Each number (except the first two) is the sum of the previous two
10. The idea is *not* to read of values, but to interpret the *form* of the graph – where is it increasing, decreasing, or where does it reach a maximum, etc.
11. First find the buying price x: $1{,}3 \times x = \text{R}78$, so $x = \text{R}60$. To make 60% profit: $\text{R}60 \times 1{,}6 = \text{R}96$
12. Make a sketch of the towns and fill in the known details:



$x = BD = 18 + 13$
13. $y = AB = 51 - (18 + 13)$
14. Area = $20 \text{ cm} \times 10 \text{ cm} = 200 \text{ cm}^2$. So $16 \times w = 200$, so $w = 200 \div 16 = 12{,}5$ cm i.e. 2,5 cm *longer*
15. Make sketches to understand the structure: $144 \text{ cm}^2 = 12 \text{ cm} \times 12 \text{ cm}$, so there will be 13 dots along each side. But the dots on the corners are counted twice, so $13 \times 4 - 4 = 48$ dots
16. 

17. $\frac{1}{13} < \frac{5}{61} < \frac{1}{n} < \frac{13}{57} < \frac{1}{4}$, i.e. $\frac{1}{13} < \frac{1}{n} < \frac{1}{4}$, so n can be 12, 11, 10, 9, 8, 7, 6 and 5.
18. If x is the price without VAT, then 1,14 × x = 9,46. So x = R8,30, so VAT = R1,16
19. Let Lynn weigh L kg etc. Add everything together: $2L + 2F + 2S = 420$, so $L + F + S = 210$
    But $L + F = 132$, so $(L + F) + S = 210$, i.e. $132 + S = 210$, so $S = 78$ kg
20. It is a base 5 system:
    ☸✠✠ for 7 = 5 + 2
    ✡✠✠✠ for 28 = 25 + 3 = $5^2 + 3$
    ✡✡☸☸✠✠ for 62 = 50 + 10 + 2 = $2 \times 5^2 + 2 \times 5 + 2$
    So 91 = 75 + 15 + 1 = $3 \times 5^2 + 3 \times 5 + 1$ = ✡✡✡☸☸☸✠
21. If the youngest sister has Rx, then we can represent the situation symbolically by:
    $x + (x + 2) + (x + 4) + (x + 6) + (x + 8) = 100$, so $5 \times x + 20 = 100$
    Or think of it like this: to make an equal sharing situation, first take away the extra money they get (2 + 4 + 6 + 8 = R20). Then there is R80 to be shared equally between the 5 sisters – each receives R16. Then give them the R2, R4, etc. that they get more than the younger sister
22. If the numbers are $x_1, x_2, \ldots$ then $x_1 + x_2 + \ldots + x_7 = 7 \times 49$
    $\therefore (x_1 + 1) + (x_2 + 2) + \ldots + (x_7 + 7) = (x_1 + x_2 + \ldots + x_7) + (1 + 2 + \ldots + 7) = 7 \times 49 + 4 \times 7$
    To get the new average, divide by 7: $(7 \times 49 + 4 \times 7) \div 7 = 49 + 4 = 53$
23. Make an appropriate representation, e.g. take the special case of 4 teams, A, B, C and D:

vs	**A**	**B**	**C**	**D**
A		X	X	X
B			X	X
C				X
D				

    So 12 teams plays a total of 11 + 10 + 9 + … + 3 + 2 + 1 = 66 games (do you have a short method?)
24. The time they run is equal, and time = distance ÷ speed
    Suppose the distance run by the cat is x metres, then the distance the dog runs is x + 36 metres
    $$\frac{x+36}{7} = \frac{x}{5}$$
    $$\therefore x = 90$$
    Can you find a more informal explanation?
25. If 60% die, then 40% of trees are alive after first year
    After 2 years, 40% of 40% = 0,4 × 0,4 = 0,16 = 16% of trees are alive
    After 3 years, 40% of 16% = 0,4 × 0,16 = 0,064 = 6,4% of trees are alive

GRADE 7(F)

1. 3 × 5 + 2 × 6 – 1 × 2 (the overlap) = 23 cm^2
2. 3 + 3 + 5 + 2 + 4 + 2 + 6 + 1 = 26 cm
4. 180 ÷ 5 × 9 = 67,5 g
5. 530,20 × 0,2 g = 106,04 g
6. Write the product of factors, but do not repeat factors, e.g. do not write 6 = 2×3, because it is already there!
8. Use the fact that the diagonal of a rectangle halves the area of the rectangle.
9. (2 + 4+ 6 + 8 + … + 98 + 100) – (1 + 3 + 5 + … + 97 + 99)
   = (2 – 1) + (4 – 3) + (6 – 5) + … + (98 – 97) + (100 – 99)
   = 1 + 1+ 1 + 1 + … 50 times = 50
10. If Sandy is x years old, Mandy is x + 7 years old. In 4 years time Sandy is x + 4 years old and Mandy is x + 11. Then $x + 4 = ½ \times (x + 11)$. So x, i.e. Sandy is 3 and Mandy is 10. 3 + 10 = 13

11. 20, 22, 24, 26, 28, (5)
40, 42, 44, 46, 48, (5)
60, 62, 64, 66, 68, (5)
80, 82, 84, 86, 88 (5) So the total is 20
12. $2^2 + 9^2 = 4 + 81 = 85$
$6^2 + 7^2 = 36 + 49 = 85$
13. 12:9. So 3 revolutions will be 36 clicks, which will revolve B 4 times.
14. Test all the cases systematically: $1 \times 17 = 17$; $2 \times 16 = 32$; $3 \times 15 = 45$; … $9 \times 9 = 81$, then the answer repeats, because the order does not matter (e.g. $2 \times 16 = 16 \times 2$).
15. 1, 2, 4, 5, 8, 10, 16, 20, 25, 80, 40, 50, 100, 125, 200, 250, 400, 500, 1000, 2000
16.

		Z
11	6	**A**
		10

11 + 6 + A = 18, so A = 1

Z + A + 10 = 18, so Z = 7

17. Be systematic!
9 + 9 + 7 = 25
9 + 8 + 8 = 25
9 + 7 + 9 = 25
8 + 9 + 8 = 25
8 + 8 + 9 = 25
7 + 9 + 9 = 25
18. You can draw it, or investigate numerical patterns for a triangle, square, pentagon, hexagon, etc. Or you can reason it out: At each vertex of an n-gon there are $n - 3$ diagonals (the point is connected to every other point, except to the two adjacent points and itself). So at n vertices there are $n \times (n - 3)$ diagonals. But do not count the diagonals twice! So $n \times (n - 3) \div 2$.
So if $n = 8$, the number of diagonals is $8 \times 5 \div 2 = 20$
19. We know: Sum of numbers $\div 11 = 8$, so the sum is 88
If the new number is x, then $(88 + x) \div 12 = 11$. So $x = 12 \times 11 - 88 = 44$
20. If there were x tests before the last, his total marks were $62 \times x$.
After the last test, $\dfrac{62 \times x + 70}{x + 1} = 64$, so $x = 4$.
21. Perimeter = $2l + 2b = 12$, so $l + b = 6$. But it is a *square*, so $l = b = 3$. So Area = 3 m × 3 m = 9 m^2
22. Look for structure! $T_{50} = 1 + 2 + 3 + 4 + \ldots + 49 + 50 = 25 \times 51 = 1275$
23. Look for structure and pattern!
$N_1 = 1$
$N_2 = 5 = 2^2 + 1$
$N_3 = 10 = 3^2 + 1$
$N_4 = 17 = 4^2 + 1$
Test the numbers! $30^2 + 1 = 901$ is the only one which fits the pattern.
24. If they mine 5%, then 95% = 0,95 is left. So:
After 1 year, 95% is left
After 2 years, 95% of 95% = $0{,}95 \times 0{,}95$ is left
After 3 years, 95% of 95% of 95% = $0{,}95 \times 0{,}95 \times 0{,}95 = 0{,}95^3$ is left
After 10 years, $0{,}95^{10}$ is left. Use a calculator: $0{,}95^{10} = 0{,}598$ = 59,8% is left
After 13 years, $0{,}95^{13}$ is left. $0{,}95^{13} = 0{,}513$ = 51,3%, more than half, is left
After 14 years, $0{,}95^{14}$ is left. $0{,}95^{14} = 0{,}487$ = 48,7%, less than half, is left
25. $(1 + 1) \times (1 + \frac{1}{2}) \times \ldots = \frac{2}{1} \times \frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \ldots \times \frac{100}{99} \times \frac{101}{100}$
$= \frac{2}{2} \times \frac{3}{3} \times \frac{4}{4} \times \frac{5}{5} \times \ldots \times \frac{100}{100} \times \frac{101}{1}$
$= 101$