JUNIOR REVISION

Form 6
Vol 9

Part 2 – Factorize

1. B	2. A	3. A	4. A	5. A	6. D	7. B
8. B	9. B					

1. $x^3 - 3x^2 + 2x - 6$
$= x^2(x-3) + 2(x-3)$
$= (x-3)(x^2+2)$

2. $8ax + 9by - 6ay - 12bx$
$= 4x(2a-3b) - 3y(2a-3b)$
$= (2a-3b)(4x-3y)$

3. $4x^2 - 12x - 9y^2 + 18y$
$= (2x)^2 - (3y)^2 - 12x + 18y$
$= (2x-3y)(2x+3y) - 6(2x-3y)$
$= (2x-3y)(2x+3y-6)$

4. $2x^2 + 3x - 8y^2 - 6y$
$= 2x^2 - 8y^2 + 3x - 6y$
$= 2(x^2-4y^2) + 3(x-2y)$
$= 2(x-2y)(x+2y) + 3(x-2y)$
$= (x-2y)(2x+4y+3)$

5. $36x^2 - (x^2+9)^2$
$= (6x - x^2 - 9)(6x + x^2 + 9)$
$= -(x^2 - 6x + 9)(x^2 + 6x + 9)$
$= -(x-3)^2(x+3)^2$

6. $(3a+2b)^2 - (a-4b)^2$
$= (3a + 2b - a + 4b)(3a + 2b + a - 4b)$
$= (2a+6b)(4a-2b)$
$= 4(a+3b)(2a-b)$

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7. $16x^2 - 9y^2 + 12y - 4$
$= (4x)^2 - (9y^2 - 12y + 4)$
$= (4x)^2 - (3y - 2)^2$
$= (4x - 3y + 2)(4x + 3y - 2)$

8. $9x^2 - 4y^2 + 12x + 4$
$= (9x^2 + 12x + 4) - (2y)^2$
$= (3x + 2)^2 - (2y)^2$
$= (3x - 2y + 2)(3x + 2y + 2)$

9. $4x^2 - 24xy + 27y^2 - 10x + 15y$
$= (2x - 3y)(2x - 9y) - 5(2x - 3y)$
$= (2x - 3y)(2x - 9y - 5)$

10. $x^2 + x^2y^2 - y^2 - 1$
$= x^2 - 1 + y^2(x^2 - 1)$
$= (x^2 - 1)(1 + y^2)$
$= (x - 1)(x + 1)(1 + y^2)$

11. $9 - 4x^2 - 6y - 4xy$
$= 3^2 - (2x)^2 - 6y - 4xy$
$= (3 - 2x)(3 + 2x) - 2y(3 + 2x)$
$= (3 + 2x)(3 - 2x - 2y)$

12. $x^2 - 25y^2 - 4x + 4$
$= (x^2 - 4x + 4) - 25y^2$
$= (x - 2)^2 - (5y)^2$
$= (x - 5y - 2)(x + 5y - 2)$

13. $12x^2 + 13xy - 35y^2 - 12x + 15y$
$= (4x - 5y)(3x + 7y) - 3(4x - 5y)$
$= (4x - 5y)(3x + 7y - 3)$

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Part 3 – Percentage

1. A	2. C	3. C	4. A	5. A	6. C	7. A
8. C	9. D	10. B	11. C			

1. Let n be the number of students in class A.

   Then the number of students in class B is $n - 18$.

   $0.375n + 0.7(n-18) = 0.5(n+n-18)$

   $0.375n + 0.7n - 12.6 = n - 9$

   $0.075n = 3.6$

   $n = 48$

   Thus, the number of boys in class $A = 48 \times 37.5\% = 18$.

2. Let N be the total number of students in the school.

   The total number of students wearing glasses

   $= N(60\%)(30\%) + N(1 - 60\%)(55\%)$

   $= 0.4N$

   The required percentage

   $= \frac{0.4N}{N} \times 100\%$

   $= 40\%$

3. $a(36\%) + b(60\%) = (a + b)(50\%)$

   $7a = 5b$

   Thus, the required ratio is 5 : 7.

4. $A = (1 + 20\%)B$

   $B = (1 - 20\%)C$

   So, we have $A = (1.2)(0.8C) = 0.96C = (1 - 4\%)C$.

   Thus, A is 4% less than C.

5. Let n be the number of pigs in the farm last year.

   Then, the number of cows last year $= n(1 - 20\%) = 0.8n$.

   The number of pigs this year

   $= n(1 + 80\%)$

   $= 1.8n$

   The number of cows this year

   $= (0.8n)(1 + 50\%)$

   $= 1.2n$

   So, we have $\frac{1.8n - 1.2n}{1.2n} \times 100\% = 50\%$.

   Thus, the number of pigs is 50% more than the number of cows.

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6. The cost of the first table

$= \frac{280}{1+40\%}$

= \$200

The cost of the second table

$= \frac{280}{1-12.5\%}$

= \$320

The gain after the two transactions

= (200)(40%) – (320)(12.5%)

= \$40

Thus, Kate gained \$40.

7. Let \$4h and \$5h be the cost and the marked price of the bicycle respectively.

$(5h)(1 - k\%) = (4h)(1 + 12.5\%)$

$1 - k\% = 0.9$

$k = 10$

8. The required interest

$= (100\ 000)\left(1+\frac{3\%}{4}\right)^{4\times 10} - 100\ 000$

$\approx 34\ 834.86123$

$\approx \$34\ 800$

9. $(1\ 000\ 000)\left(1+\frac{p\%}{12}\right)^{2} = 1\ 000\ 000 + 14\ 049$

$1 + \frac{p\%}{12} = 1.\ 007$

$p = 8.4$

10. $P\left(1+\frac{5\%}{4}\right)^{4\times 3} - P\left(1+\frac{5\%}{4}\right)^{4\times 2} = 675$

$P \approx 11\ 996.07242$

$P \approx 11\ 996$

11. Let \$$P$ be the principal.

$P\left(1+\frac{8\%}{2}\right)^{2\times 5} - P = 30\ 000$

$P \approx 62\ 468.20825$

Thus, the principal is \$62 000.

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12. Let b be the base of triangle B.

Then, the base of triangle $A = b(1 + 30\%) = 1.3b$

Since the triangles A and B are similar figures, we have

$$\frac{\text{Area of triangle } A}{\text{Area of triangle } B} = \left(\frac{1.3b}{b}\right)^2 = 1.69$$

The required percentage

$= (1.69 - 1) \times 100\%$

$= 69\%$

13. Let ℓ and w be the original length and original width of the rectangle.

Then the new length and the new width of the rectangle are $\ell(1 + 25\%)$ and $w(1 - k\%)$ respectively.

$\ell w(1 + 25\%)(1 - k\%) = \ell w(1 - 25\%)$

$1 - k\% = 0.6$

$k = 40$

14. Let V mL be the original volume of the cocktail.

$V(8\%) + 90 = (V + 90)(20\%)$

$V = 600$

The original volume of alcohol

$= 600(8\%)$

$= 48$ mL

The required percentage increase

$= \frac{90}{48} \times 100\%$

$= 187.5\%$

15. (a) Let $\$x$ be the monthly wage of Richard.

Then, the monthly wage of Peter $= x(1 - 15\%) = \$0.85x$.

The monthly wage of Ben

$= \frac{0.85x}{(1+10\%)}$

$= \$\frac{17}{22}x$

So, we have $x + 0.85x + \frac{17}{22}x = 57\ 700$.

Hence, we have $x = 22\ 000$.

Thus, the monthly wage of Richard is \$ 22 000.

(b) From (a), the monthly wage of Ben is \$17 000.

$17\ 000 - x = (22\ 000 + x)(1 - 37.5\%)$

$x = 2\ 000$

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16. Let Peter bought the camera for $\$c$ one year ago.

The cost for HY buying the camera

$= c(1 + 20\%)$

$= \$1.2c$

Note that the gain made by HY is equal to the loss made by Peter.

The gain made by HY

$= c(3\%)$

$= \$0.03c$

The required percentage profit

$= \dfrac{0.03c}{1.2c} \times 100\%$

$= 2.5\%$

17. Let $\$c$ be the cost.

$$\begin{aligned}(c+30)(1-40\%) &= c(1-25\%)\\ 0.6c+18 &= 0.75c\\ 0.15c &= 18\\ c &= 120\end{aligned}$$

Thus, the selling price $= 120 \times (1-25\%) = \$90$

18. (a) Let $\$c$ be the cost of the super watch.

Then, the marked price of the super watch $= c(1 + 40\%) = \$1.4c$

$(1.4c)(1 - 20\%) - c = 84$

$c = 700$

Thus, the cost of the super watch is \$700.

(b) The required percentage profit

$= \dfrac{(700+84)(1-10\%)-700}{700} \times 100\%$

$= 0.8\%$

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Part 4 – Ratio

1. B	2. C	3. C	4. B	5. D	6. D	7. C

1. Since $a : b = 2 : 3$, we have $a = \frac{2}{3}b$.

   So, we have $\frac{\left(\frac{2}{3}b\right)+c}{2b-c} = \frac{3}{5}$.

   Hence, we have $b = 3c$.

   Thus, we have $b : c = 3 : 1$.

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

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

   $a = 3$

   So, we have $(3 + 1) : b = 2 : 4$.

   Thus, we have $b = 8$.

3. 1 : 3 000

   = 1 m : 3 000 m

   = 1 m : 3 km

   = 1 m^2 : 9 km^2

   The actual area of HY's house

   = 9 × 30

   = 270 km^2

4. 1 : 2 000

   = 1 cm : 20 m

   = 1 cm^2 : 400 m^2

   The area of the garden on the map

   $= \frac{1}{400} \times 400$

   = 1 cm^2

5. 300 cm^2 : 2 700 km^2

   = 1 cm^2 : 9 km^2

   = 1 cm : 3 km

   = 1 cm : 3 000 m

   = 1 cm : 300 000 cm

   Thus, the scale on the map is 1 : 300 000.

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6. Let x and y be the original number of normal apples and rotten apples respectively.
Then, we have
$x(1-7\%) : [y + x(7\%)] = 18 : 7$
$5.25x = 18y$
$7x = 24y$
Thus, the required ratio is 24 : 7.

7. $\left[500\left(\dfrac{x}{x+y}\right)+100\right] : 500\left(\dfrac{y}{x+y}\right) = 4 : 3$

$15x + 3(x + y) = 20y$
$18x = 17y$
Thus, we have $x : y = 17 : 18$.

8. Since $2a = 3b$ and $\dfrac{1}{b} : \dfrac{1}{c} = 6 : 1$, we have $a : b = 3 : 2$ and $b : c = 1 : 6$.

Therefore, we have $a : b : c = 3 : 2 : 12$.

Let $a = 3k$, $b = 2k$ and $c = 12k$, where k is a non-zero constant.

$\dfrac{2c-b}{c+2a}$

$= \dfrac{2(12k)-(2k)}{(12k)+2(3k)}$

$= \dfrac{11}{9}$

9. $\dfrac{4}{3a} = \dfrac{7}{6b}$

$\dfrac{8}{a} = \dfrac{7}{b}$

So, we have $\dfrac{1}{a} : \dfrac{1}{b} = 7 : 8$.

$\dfrac{7}{6b} = \dfrac{3}{4c}$

$\dfrac{14}{b} = \dfrac{9}{c}$

So, we have $\dfrac{1}{b} : \dfrac{1}{c} = 9 : 14$.

Thus, we have $\dfrac{1}{a} : \dfrac{1}{b} : \dfrac{1}{c} = 63 : 72 : 112$.

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10. $\dfrac{4a-5b}{3b-2a}=3$

$4a - 5b = 3(3b - 2a)$

$10a = 14b$

$a = \dfrac{7}{5}b$

So, we have $2c = \left(\dfrac{7}{5}b\right) + 3b$.

Hence, we have $11b = 5c$.

Thus, we have $b : c = 5 : 11$.

11. Number of boys wearing glasses $= 1\ 000\left(\dfrac{2}{5}\right)\left(\dfrac{5}{8}\right) = 250$

Number of girls wearing glasses $= 1\ 000\left(\dfrac{3}{5}\right)\left(\dfrac{x}{x+y}\right) = \dfrac{600x}{x+y}$

$250 + \dfrac{600x}{x+y} = 475$

$5x = 3y$

Thus, we have $x : y = 3 : 5$.

12. The original number of apples $= \dfrac{3}{8}n$

The original number of oranges $= \dfrac{5}{8}n$

$\left(\dfrac{3}{8}n-100\right):\left(\dfrac{5}{8}n-200\right) = 2 : 3$

$\dfrac{1}{8}n = 100$

$n = 800$

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