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Test 1

This test is graded out of 55 marks. No books, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. *(2 marks)* Write the percent 0.3% into a fraction and into a decimal.

$$0.003 \qquad , \qquad \frac{3}{1000}$$

Question 2. *(1 mark)* Reduce the fraction $\frac{58}{76}$ to lowest terms.

$$\frac{29}{38}$$

Question 3. *(1 mark)* Bring the fraction $\frac{3.25}{5.75}$ to higher terms to eliminate the decimals.

$$\frac{13}{23}$$

Question 4. *(3 marks)* Simplify the following:

$$9\left[\frac{(2(3^2))-2(4-3)}{2^4-1}\right]+3 = 9\left(\frac{2\cdot 9-2}{16-1}\right)+3$$

$$= 9\left(\frac{18-2}{15}\right)+3$$

$$= 3\left(\frac{16}{5}\right)+3$$

$$= \frac{48}{5}+3 = \frac{48+15}{5} = \frac{63}{5}$$

Question 5. *(3 marks)* Simplify the following:

$$6(3-yx)(x+y-1)-(3-a)(x+y)$$

$$= 6\left[3x+3y-3-x^2y-xy^2+xy\right]-\left[3x+3y-ax-ay\right]$$

$$= 18x+18y-18-6x^2y-6xy^2+6xy-3x-3y+ax+ay$$

$$= 15x+15y-18-6x^2y-6xy^2+6xy+ax+ay$$

Question 6. *(2 marks)* Expand the following:

$$(x-1)(x+y+z-1) = x^2 + xy + xz - x - x - y - z + 1$$
$$= x^2 + xy + xz - 2x - y - z + 1$$

Question 7. *(3 marks)* Simplify the following:

$$\frac{x^3(xy^2)^3 y^{-3}}{(x^{-1}y^2)^3} = \frac{x^3(x^3y^6)}{x^{-3}y^6 y^3}$$
$$= \frac{x^6 x^3 y^6}{y^6 y^3}$$
$$= \frac{x^9}{y^3}$$

Question 8. *(2 mark)* Evaluate the following to two decimal places:

$$\ln(e^8(1.3)) = \ln e^8 + \ln 1.3$$
$$= 8\ln e + \ln 1.3$$
$$= 8 + 0.26$$
$$= 8.26$$

Question 9. *(1 mark)* Rewrite the exponential $9^2 = 81$ as a logarithm.

$$\log_9 81 = 2$$

Question 10. *(1 mark)* Rewrite the logarithm $\ln 1 = 0$ as an exponential.

$$e^0 = 1$$

Question 11. *(1 mark each)*
Evaluate the following to two decimal places:

1. $\sqrt{152} \overset{\circ}{=} 12.33$
2. $321^{\frac{2}{3}} \overset{\cdot}{=} 46.88$
3. $\frac{1-4^{-1}}{2} \overset{\cdot}{=} 0.38$
4. $\sqrt{19} - 7.4523 = -3.09$

Question 12. *(4 marks)*
Let $r = 0.045$, $S = 2150$, $P = 201$. Solve for t and evaluate t to two decimal places:

$$S = P\left[1 - \frac{rt}{365}\right]$$

$$S = P - \frac{Prt}{365}$$

$$-S+P = \frac{Prt}{365}$$

$$\frac{365(-S+P)}{Pr} = t$$

$$t = \frac{365\,(-S+P)}{Pr}$$

$$t = \frac{365\,(201-2150)}{0.045\,(201)}$$

$$= -78\,649.53$$

Question 13. *(2 marks)*
Let $PMT = 244$, $i = 0.06$, $n = 36$, evaluate FV to two decimal places:

$$FV = PMT\left[\frac{(1+i)^n - 1}{i}\right]$$

$$= 244\left[\frac{(1+0.06)^{36} - 1}{0.06}\right]$$

$$= 29\,065.49$$

Question 14. *(3 marks)*
Solve for x:

$$1 + 3(x+2) + (x-8) - (x-1) = 4(4x-2)$$

$$1 + 3x + 6 + x - 8 - x + 1 = 16x - 8$$

$$3x = 16x - 8$$

$$8 = 13x$$

$$\frac{8}{13} = x$$

Question 15. *(3 marks)*

Solve for x:

$$\frac{2}{7}(3x-2) - \frac{3}{5}(5x-2) = \frac{7}{20} - x$$

$LCD = 140$

$$140\left(\frac{2}{7}\right)(3x-2) - 140\left(\frac{3}{5}\right)(5x-2) = 140\left(\frac{7}{20}\right) - 140x$$

$$40(3x-2) - 84(5x-2) = 7(7) - 140x$$

$$120x - 80 - 420x + 168 = 49 - 140x$$

$$39 = 160x$$

$$\frac{39}{160} = x$$

Question 16. *(2 marks)*

Change the ratio 30 : 90 : 118 to lower terms.

$$30 : 90 : 118$$
$$15 : 45 : 59$$

Question 17. *(2 marks)*

Change the ratio 1.3 : 7.1 : 10.3 to higher terms to eliminate the decimals of each proportion.

$$1.3 : 7.1 : 10.3$$
$$13 : 71 : 103$$

Question 18. *(4 marks)*

John the farmer decides to sell part of his land to help his financial situation. He sells two lots one of $1\frac{1}{2}$ and the other of $2\frac{1}{6}$ hectares at a price of \$25 000 per hectare. He then sells an additional lot of $4\frac{1}{5}$ hectare at a price of \$15 000 per hectare. How much will John obtain from the sale of the lots?

$$amount\ from\ sales = \left(1\frac{1}{2} + 2\frac{1}{6}\right)25\,000 + 4\frac{1}{5}(15\,000)$$

$$= \left(\frac{3}{2} + \frac{13}{6}\right)25\,000 + \frac{21}{5}(15\,000)$$

$$= 91\,666.67 + 63\,000$$

$$= \$154\,666.67$$

∴ John will obtain $154 666.67 from the sales of the lots.

Question 19. *(4 marks)*

Jean opens a savings account with zero interest at his favorite bank. He makes an initial deposit of $4 000 on January 1st, he withdraws $1 300 on April 1st, he deposits $700 on August 1st, he deposits $200 on October 1st. What was Jean average monthly balance of his savings account for the year?

Balance of Account	# months
4000	3
2700	4
3400	2
3600	3

Average montly balance
$$= \frac{3(4000) + 4(2700) + 2(3400) + 3(3600)}{12}$$
$$\approx \$3366.67$$

Question 20. *(4 marks)*

Emilie and Yann are getting insured at their new appartment. The insurance cost $564.00. They agree that the cost will be divided in a ratio of five to seven and that Emilie will pay more. How much money will Yann pay for the insurance?

ratio $5:7$ ∴ #parts 12

Yann will pay $= \frac{5}{12}(564.00) = \$235.00$

Question 21. *(4 marks)*

If a business has a net income of $2 120 000 that is split between its three investor in the ratio $\frac{1}{3} : \frac{1}{7} : \frac{1}{9}$, how much will each investor receive?

The LCD of $\frac{1}{3}, \frac{1}{7}, \frac{1}{9}$ is 63.
terms by multiplying with the LCD.
number of parts is 37

We bring our ratio to higher
$21 : 9 : 7$ and the total

∴ the first investor will get $\frac{21}{37}(2 120 000) = \$1 203 243.24$

the second investor will get $\frac{9}{37}(2 120 000) = \$515 675.68$

the third investor will get $\frac{7}{37}(2 120 000) = \$401 081.08$

Bonus Question *(2 marks)*

Isolate n (i.e. solve for n).

$$FV = PMT\left[\frac{(1+i)^n - 1}{i}\right]$$

$\frac{i \cdot FV}{PMT} = (1+i)^n - 1$

$(1+i)^n = 1 + \frac{i FV}{PMT}$

$\ln(1+i)^n = \ln\left(1 + \frac{i FV}{PMT}\right)$

$n \ln(1+i) = \ln\left(1 + \frac{i FV}{PMT}\right)$

$n = \dfrac{\ln\left(1 + \frac{i FV}{PMT}\right)}{\ln(1+i)}$