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Test 1

This Test is graded out of 50 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. *(1 mark)*
Change the percent 0.1% into a fraction.

$$0.1\% = 0.001 = \frac{1}{1000}$$

Question 2. *(1 mark)*
Reduce the fraction $\frac{24}{36}$ to lowest terms.

$$\frac{24}{36} = \frac{2(12)}{3(12)} = \frac{2}{3}$$

Question 3. *(1 mark)*
72% of what number is 120.

$$120 = 0.72\,(x)$$
$$\frac{500}{3} = x \qquad \longrightarrow \quad x = 166.6\overline{6}$$

Question 4. *(2 marks)*
Simplify the following:

$$25 + 8\left[\frac{4^2 - 2(3-4)}{3^3 - 1}\right] - 2 \;=\; 25 + 8\left[\frac{16 - 2(-1)}{27 - 1}\right] - 2 \qquad \longrightarrow = \frac{371}{13}$$

$$= 25 + 8\left(\frac{18}{26}\right) - 2 \qquad\qquad \doteq 28.54$$

$$= 25 + \frac{72}{13} - 2$$

Question 5. *(2 marks)*
Simplify the following:

$$2(x-4)(2-x) - 5(4y+9)(y-3)$$

$$= 2\left[-x^2 + 2x - 8 + 4x\right] - 5\left[4y^2 - 12y + 9y - 27\right]$$

$$= 2\left[-x^2 + 6x - 8\right] - 5\left[4y^2 - 3y - 27\right]$$

$$= -2x^2 + 12x - 16 - 20y^2 + 15y + 135$$

$$= -2x^2 + 12x - 20y^2 + 15y + 119$$

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

$$(x-1)^3 \;=\; (x-1)(x-1)(x-1)$$

$$= \left[x^2 - 2x + 1\right](x-1)$$

$$= x^3 - 2x^2 + x - x^2 + 2x - 1$$

$$= x^3 - 3x^2 + 3x - 1$$

Question 7. *(2 marks)*
Simplify the following:

$$\frac{(2x^4)^2(3y^3)^3}{(x^2y)^4} = \frac{2^2 x^{4\cdot2}(3^3 y^{3\cdot3})}{x^{2\cdot4} y^4}$$

$$= \frac{4 x^8 (27 y^9)}{x^8 y^4}$$

$$\to = 108 y^{9-4}$$

$$= 108 y^5$$

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

$$\ln\left(\frac{100}{e^7}\right) = \ln(100) - \ln(e^7)$$

$$= \ln(100) - 7\ln(e)$$

$$= \ln(100) - 7$$

$$\doteq -2.39$$

Question 9. *(1 marks)*
Rewrite the exponential $5^{-2} = \frac{1}{25}$ as a logarithm.

$$\log_5 \frac{1}{25} = -2$$

Question 10. *(1 mark each)*
Evaluate the following to two decimal places:

1. $\sqrt{169} = 13$
2. $25^{\frac{2}{3}} \doteq 8.55$
3. $\frac{5-10^{-1}}{2} = 49/20 = 2.45$
4. $\sqrt{10} - 3.8723 \doteq -0.71$

Question 11. *(2 marks)*
Let $r = 0.35, s = 2150, t = 201$ and evaluate p to two decimal places:

$$p = s\left[1 - \frac{rt}{360}\right]$$

$$p = 2150\left[1 - \frac{(0.35)(201)}{360}\right]$$

$$\doteq 1729.85$$

Question 12. *(4 marks)*
Let $V = 211, r = 0.34, R = 1.1$, solve for v then evaluate v to two decimal places:

$$\frac{(R+r)}{r} = \frac{V}{v} \implies v = \frac{rV}{(R+r)}$$

$$= \frac{0.34(211)}{(1.1+0.34)}$$

$$\doteq 49.82$$

Question 13. *(3 marks)*
Solve for x:

$$4(x-2)+(x-6)=2(3x-3)$$

$$4x-8+x-6=6x-6$$

$$-8=x$$

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

$$\frac{2}{3}(3x+2)-\frac{2}{5}(15x-3)=\frac{11}{15}+x$$

$$\overset{5}{15}\left(\frac{2}{3}\right)(3x+2)-\overset{3}{15}\left(\frac{2}{5}\right)(15x-3)=\frac{15\cdot11}{15}+15x$$

$$10(3x+2)-6(15x-3)=11+15x$$

$$30x+20-90x+18=11+15x$$

$$27=75x$$

$$\frac{9}{25}=x$$

$$0.36=x$$

Question 15. *(2 marks)*
Solve for the proportion $3:7=12:x$.

$$\frac{3}{7}=\frac{12}{x}$$

$$x=\frac{12(7)}{3}$$

$$x=28$$

Question 16. *(2 marks)*
Change the proportion to higher terms to eliminate the decimals of the proportion $2.25:5.5:7.75$.

$$2.25\times4 : 5.5\times4 : 7.75\times4$$

$$9 : 22 : 31$$

Question 17. *(4 marks)*
Two cooks worked together for $6\frac{1}{2}$, $7\frac{1}{4}$ and $10\frac{3}{4}$ hours respectively. What was the cost of labour if the first cook earns $20.25 per hour and the second cook earns $10.25 per hour.

$$\text{Hours worked}=6\frac{1}{2}+7\frac{1}{4}+10\frac{3}{4}=24\frac{1}{2}$$

$$\text{Cost of Labour}=20\frac{1}{4}\left(24\frac{1}{2}\right)+10\frac{1}{4}\left(24\frac{1}{2}\right)$$

$$=\$747.25$$

Question 18. *(4 marks)*
Yann is making an inventory of all his computer cables (Yann has too many computer cables). One box of cables contains 35 cables. He noticed that he has six times the amount of SCSI cables as PS2 cables. How many SCSI cables does Yann have?

Let x be the amount of PS2 cables

SCSI cables: $6x$

PS2 cables: x

Total Cables: 35

$\therefore$ Yann has $6(5) = 30$ SCSI cables

$$6x + x = 35$$
$$7x = 35$$
$$x = 5$$

Question 19. *(4 marks)*
Emilie and Yann are discussing a partnership for a photography company. They require an initial investment of $40 000. They agree that Emilie will invest $1500 plus four-seventh of the amount Yann will invest. How much money will Emilie invest?

Let x be the amount Yann will invest.

Emilie invest: $\frac{4}{7}x + 1500$

Yann invest: x

Total investment: $40\,000$

$\therefore$ Emilie will invest
$\frac{4}{7}(24\,500) + 1500 = \$15\,500$

$$\left(\frac{4}{7}x + 1500\right) + x = 40\,000$$
$$\frac{11x}{7} = 38\,500$$
$$x = 24\,500$$

Question 20. *(4 marks)*
If a business has a net income of $120 000 and is split between its three investor in the ratio $5:3:2$, how much will each investor get.

There are a total of $5+3+2 = 10$ parts to be divided.

First investor gets $\frac{5}{10}(120\,000) = \$60\,000$

Second investor gets $\frac{3}{10}(120\,000) = \$36\,000$

Third investor gets $\frac{2}{10}(120\,000) = \$24\,000$

Bonus Question *(2 marks)*
What is the sum of $1, 2, 3, \ldots, 10\,000$?

$\frac{n(n+1)}{2}$ where n is $10\,000$

$$\frac{10\,000(10\,000+1)}{2} = \frac{10\,001(10\,000)}{2}$$
$$= 50\,005\,000$$