

starts from P with the design to pass through Q, and B starts from Q and travels in the same direction as A. When A overtook B it was found that they had together travelled 30 miles, that A has passed thro' Q four hours before, and that B, at his rate of travelling, was nine hours journey distant from P. Find the distance between P and Q. (By arithmetic.)

Pass paper, Junior Matriculation, Toronto University, June, 1879.

1. Define the greatest common measure and least common multiple of any number of quantities. How is the L. C. M. of a number of fractions found?

$$\text{Add together } \frac{13}{42}, \frac{59}{63}, \frac{83}{121}, \frac{3}{70}, \frac{91}{110}, \frac{91}{264}.$$

2. Prove the rule for the conversion of a circulating decimal into a vulgar fraction, using a numerical example.

3. Distinguish between interest and discount and show that if P, I, D, be respectively the principal sum, and the interest and discount upon it for any given time.

$$\frac{I}{D} = \frac{I}{I} + \frac{I}{P}$$

4. A person has an income derived from £3,360 which was originally invested in the four per cents. at 96; if he now sells out at 94 and invests one-half of the proceeds in railway stock at 82½ which pays a dividend of 3 per cent., and the other half in bank stock at 164½, paying 8½ per cent. dividend, what difference will he find in his income?

5. Simplify (i) $\frac{2^{n+4} - 2 \times 2^n}{2^{n+2} \times 4}$

(ii) $\frac{x^2 + \left(\frac{a}{b} + \frac{b}{a}\right)xy + y^2}{x^2 + \left(\frac{a}{b} - \frac{b}{a}\right)xy - y^2}$

(iii) $\frac{a^2 + b^2}{b} - a \quad \frac{a^2 - b^2}{a^3 + b^3} \times \frac{\frac{1}{b} - \frac{1}{a}}{a^3 + b^3} \times$

$$\left(\frac{a+b}{a-b} + \frac{a-b}{a+b}\right) \left(\frac{a}{a+b} + \frac{b}{a-b}\right)$$

6. Divide $6x^5 - 4x^4 - 19x^3 + 23x^2 - 13x + 3$ by $3x^2 - 2x + 1$ (i) in full; (ii) by Horner's method.

7. Prove the rule for finding the G. C. M. of two quantities. Find G. C. M. of $x^3 + x^2y + 3xy^2 + y^3$ and $x^3 + 3x^2y + xy^2 - y^3$.

8. Solve

(i) $\frac{3-x}{3+x} - \frac{2-x}{2+x} + \frac{1-x}{1+x} = 1$

(ii) $x^2 + 4.8x + 2.87 = 0$

(iii) $\sqrt{2+1-\left(\frac{1}{2}-1\right)^{-1}} = 0$

9. Extract the square root of $32 + 10\sqrt{7}$.

10. Solve (i) $x+y=a, x^2+y^2=14x^2y^2$

(ii) $\begin{cases} \frac{(x+y)^2}{a^2} + \frac{(x-y)^2}{b^2} = 8 \\ x^2 + y^2 = 2(a^2 + b^2) \end{cases}$

(iii) $\begin{cases} (x+y)(x^2+y^2) = 1216 \\ x^2 + xy + y^2 = 49 \end{cases}$

(iv) $x^2y^2=a, y^2zx=b, z^2xy=c.$

11. If a side of a triangle be produced, the exterior angle is equal to the two interior and opposite angles; and the three interior angles of every triangle are together equal to two right angles.

The difference of the angles at the base of any triangle is double the angle contained by a line drawn from the vertex perpendicular to the base and another bisecting the angle at the vertex.

12. To describe a parallelogram that shall be equal to a given triangle, and have one of its angles equal to a given rectilineal angle.

13. The opposite angles of any quadrilateral figure inscribed in a circle are together equal to two right angles.

If two opposite sides of a quadrilateral figure inscribed in a circle be equal, prove that the other two are parallel.

SOLUTIONS.

3. Let r denote the rate, and t the time;