

6. Translate into German:—

Why do you come alone?
 My friend is very busy; it will be an hour before he can come.
 It is better late than never.
 On what floor does he live?
 On the fourth, and the steps are very steep.
 Changeable weather is better than continual rain.
 Unlock your trunk, I say.
 Your room was not locked.

7. What are the principal auxiliary verbs, and how are they used?

8. With regard to each of the following compound verbs, say whether the prefix is separable or inseparable: *anerkennen, auferstehen, durchreisen, missbrauchen, misshandeln, missrechnen*, and *umdrehen*? Give the meaning in each case?

9. Give the German for the following prepositions: *above, about, by, at, to, from, with*. State what case or cases each word governs, and give examples?

10. When is the subjunctive mood employed in German?

Algebra.—For Class D, and for Junior Civil Service. Time allowed: 3 hours.

1. Explain in full the meaning of the expression $\frac{5a^2+3bc-2ac}{\sqrt{4a^2+2b^2+3}}$, and find its numerical value when $a=5$, $b=3$, $c=1$.

2. Add together $\{(p-q)a-(q-r)b\} - \{(p+q)a+(q+r)b\}$ and $pa+rb+q(a+b)$

Multiply $3x^{n-3}+x^{n-2}-2x^{n-1}-4x^n$ by $2x^{n-3}+3x^{n-4}$

3. Divide $x^8+x^6y^2+x^4y^4+x^2y^6+y^8$ by $x^4+x^3y+x^2y^2+xy^3+y^4$
 and $x^5-(1+m)x^4+(1+m+n)x^3-(m+n+p)x^2+(n+p)x-p$ by x^2-x+1

4. Find the factors of x^4-3x^2-4 ; x^3+x^2+1 ; $a^3-b^3-a^2b+ab^2$

5. Simplify—

$$\frac{1 - \frac{a^2}{(x+a)^2}}{(x+a)(x-a)} \div \frac{x(x+2a)}{(x^2-a^2)(x+a)}$$

$$\text{and } \frac{3}{4x^4-8x^2+4} - \left\{ \frac{1-x}{4-4x^2} - \left(\frac{1}{8+8x} - \frac{3}{8x-8} \right) \right\}$$

6. If $u = y + z - x$, $v = z + x - y$, $w = x + y - z$, find in terms of x , y , and z the value of $u^3+v^3+w^3-3uvw$, and prove that $x+y+z$ is a factor of the result.

Find the relation between a , b , and c if x^2-ax+b^2 is exactly divisible by $x-c$

7. Solve the equations:—

$$\frac{3-2x}{1-2x} - \frac{2x-5}{2x-7} = 1 - \frac{4x^2-2}{7-16x+4x^2}$$

$$\frac{1}{x-13} - \frac{2}{x-15} + \frac{2}{x-18} = \frac{1}{x-19}$$

8. Solve the equations:—

$$\frac{a-b}{x-1} + \frac{b-c}{x-2} + \frac{c-a}{x-3} = 0$$

$$\begin{cases} \frac{3x+y}{9} - \frac{5y-2x}{7} = \frac{3y+1}{14} \\ (x+20)^2 - (x+y)(x-y) = (y+22)^2 \end{cases}$$

9. I walk for $2\frac{1}{2}$ hours at my usual pace, and then for $1\frac{1}{4}$ hours at half a mile an hour slower than that pace: if the total distance travelled be $12\frac{1}{2}$ miles, find my usual pace.

10. A and B run two races, each of 400 yards. In the first A gives B a start of 20 seconds, and wins by 50 yards; in the second A gives B a start of 125 yards, and wins by 5 seconds. Find the speed of each runner.

Algebra.—For Senior Civil Service. Time allowed: 3 hours.

1. If $a = \frac{3}{4}$, $b = 1$, $c = 1\frac{1}{4}$, and $s = \frac{1}{2}(a+b+c)$, find the value of $\frac{(s-a)(s-b)}{s(s-c)}$; and show that $(s-b)^3 + (s-c)^3 = a^3 - 3a(s-b)(s-c)$

2. Divide $a^2 - a^{\frac{4}{3}}b^{\frac{2}{3}} - a^{\frac{2}{3}}b^{\frac{4}{3}} + b^2$ by $a^2 - a^{\frac{2}{3}}b^{\frac{1}{3}} - a^{\frac{1}{3}}b^{\frac{2}{3}} + b^2$, and verify the result by resolving dividend and divisor into their ultimate factors.

What is the condition requisite that x^3+ax^2+bx+c may be divisible by $x-n$?

3. Expand $(a^2-2x^2)^4$; and write down the coefficient of x^n in the square of $1-x+x^2-x^3+\dots$

4. Resolve the following expressions into factors, and write down their L.C.M.:—

$$(ax^2-4a)^2, a^2x^2-5a^2x+6a^2, ax^2-ax-6a$$

Also, find the highest common factor of—

$$2x^3+5x^2+9x+9 \text{ and } 3x^3+4x^2+10x+3$$

5. Simplify the expressions—

$$(a.) \left\{ 1 - \frac{2x^2}{a^2} + \frac{2x^4}{a^2(a^2+x^2)} \right\} \left\{ \frac{2a^4}{x^2(a^2-x^2)} - \frac{2a^2}{x^2} - 1 \right\}$$

$$(b.) \frac{yz}{x(x^2-y^2)(x^2-z^2)} + \frac{xz}{y(y^2-x^2)(y^2-z^2)} + \frac{xy}{z(z^2-x^2)(z^2-y^2)}$$