SHERBORNE SCHOOL.

CHRISTMAS EXAMINATION, 1899.

VI—IV A.

Algebra.

(*Form VI and Army Class not to do questions marked *.*)

1*. Add $a-2b+3c-4d$, $3b-4c+5d-2a$, $5c-6d+3a-4b$, $7d-4a+5b-4c$.

2*. Subtract $8x^2+7x+9$ from the difference of $7x^2-9x-5$ and $8x^2+11x-12$.

3*. Multiply together $x+1$, $x+2$, $x+3$, and square $3-5x+2x^2$.

4. Divide $x^3-3x^2y+3xy^2-y^3$ by $x-y$ and x^6-2x^3+1 by x^2-2x+1.

5. Arrange according to powers of x so that the signs before the brackets may be negative:

$$3x^2-7ax+11bx^3+5bx-7x^3+10ax^2-3bx-10ax-5ax^3.$$

6. Solve the equations:

*(1) $21(4x-5)=24(3x-5)+27$;

(2) $\dfrac{7x+5}{6}-\dfrac{5x+6}{4}=\dfrac{8-5x}{12}$;

(3) $\frac{1}{14}(3x+\frac{11}{3})-\frac{1}{7}(4x-2\frac{2}{3})=\frac{1}{2}(5x-1)$;

(4) $\left.\begin{aligned}\frac{x-1}{3}&=\frac{y+1}{4},\\ \frac{2x-3}{5}&=\frac{13-2y}{7};\end{aligned}\right\}$

(5) $\dfrac{2x+3}{x+1}=\dfrac{4x+5}{4x+4}+\dfrac{3x+3}{3x+1}$.

7. After A has received $10l.$ from B he has as much money as B and $6l.$ more; between them they have $40l.$: what money had each at first?

8. Find the L.C.M. of x^2-4x+3, $4x^3-9x^2-15x+18$. The H.C.F. of two expressions is $x-7$, and their L.C.M. is $x^3-10x^2+11x+70$. One expression is $x^2-5x-14$. Find the other.

9. Simplify :

*(1) $\dfrac{b-c}{bc}+\dfrac{c-a}{ca}+\dfrac{a-b}{ab}$;

(2) $\dfrac{a}{a-b}+\dfrac{b}{a+b}+\dfrac{ab}{b^2-a^2}-\dfrac{b^2}{a^2+b^2}$;

(3) $\dfrac{x-2}{x-2-\dfrac{x}{x-\dfrac{x-1}{x-2}}}$;

(4) $\dfrac{x^4-13x^2+36}{x^4-26x^2+25}\div\dfrac{x^2-x+6}{x^2+4x-5}$.

10. Solve:

(1) $x^2+y^2=149,\ x-y=3$;

(2) $2x^2+7x+16=0$;

(3) $\dfrac{3x-2}{2}+\sqrt{2x^2-5x+3}=\dfrac{(x+1)^2}{3}$;

(4) $3x^2-2y^2+5z^2=0,$
$7x^2-3y^2-15z^2=0,$
$5x-4y+7z=6.$

11. Find the square root of :

(1) $x^{\frac{4}{3}}-14x^{\frac{2}{3}}+49+2x^{-\frac{1}{3}}-14x^{-1}+x^{-2}$;

(2) $52-7\sqrt{12}$.

12. Sum the series:

(1) $1, 3, 5, 7\ldots$ to n terms;

(2) $1-\frac{2}{3}+\frac{4}{9}-\frac{8}{27}$ to ∞ terms.

Prove that $1^3+2^3+3^3+$ to n terms $=\left(\dfrac{n\,.\,n+1}{2}\right)^2$.

13. Find the greatest terms in the expansion of $(a+x)^n$, n being a positive integer.

Expand $(1-4x)^{-\frac{3}{2}}$ to five terms, and prove that the $(r+1)^{\text{th}}$ term is

$$\frac{|\underline{2r+1}}{\{|\underline{r}\}^2}\,x^r.$$

14. Resolve into factors :

(1) $(a-b)^3+(b-c)^3+(c-a)^3$;

(2) x^6-y^6;

(3) $10x^4-x^3-36x^2-11x+14$.