Blandade Uppgifter   Kap 1

6. a) $4(3x-5)=16$ $(\div 4)$

$3x-5=4$ $(+5)$

$3x=9$ $(\div 3)$

$\underline{\underline{x=3}}$

b) $2(1{,}5x+7)=10x$ $(\div 2)$

$1{,}5x+7=5x$ $(-1{,}5x)$

$7=3{,}5x$

$3{,}5x=7$ $(\div 3{,}5)$

$\underline{\underline{x=2}}$

c) $2{,}5(8+2x)=8+7x$

$20+5x=8+7x$ $(-7x)$

$-2x+20=8$ (-20)

$-2x=-12$ $(\div(-2))$

$\underline{\underline{x=6}}$

7. a) $\frac{1}{2}(5a-4b+7)=2{,}5a-2b+3{,}5$

b) $3x(x+2xy-3y)=3x^2+6x^2y-9xy$

8. a) $(2x-5)-(3x+1)(9-1)=$

$=2x-5-(3x+1)\cdot 8=$

$=2x-5-(24x+8)=$

$=2x-5-24x-8=\underline{\underline{-22x-13}}$

b) $3x(x-4)-(3x+2)(x-1)=$
$=3x^2-12x-(3x^2-3x+2x-2)=$
$=3x^2-12x-3x^2+x+2=$
$=\underline{\underline{-11x+2}}$

c) $\dfrac{4x^2+12x}{x+3}=\dfrac{4x(x+3)}{x+3}=\underline{\underline{4x}}$

9. a) $\dfrac{10x-14}{6x}=\dfrac{\cancel{2}(5x-7)}{\cancel{2}\cdot 3x}=\dfrac{5x-7}{3x}$

b) $\dfrac{20x^2-12x}{12x^2}=\dfrac{\cancel{4x}(5x-3)}{\cancel{4x}\cdot 3x}=\dfrac{5x-3}{3x}$

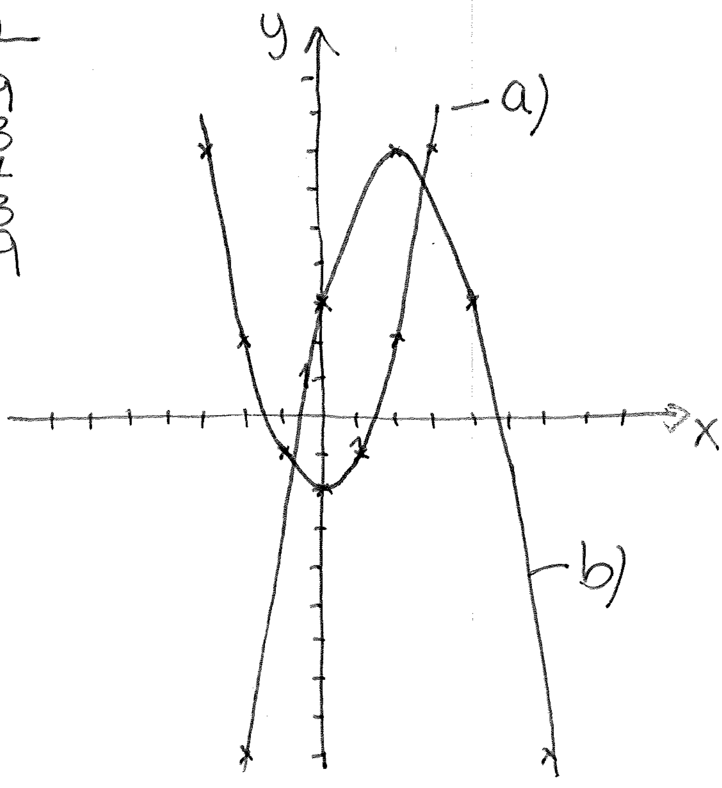
c) $\dfrac{9a^2-6ab}{18ab-12b^2}=\dfrac{{}^{1}\cancel{3}a\,\cancel{(3a-2b)}}{{}_{2}\cancel{6}b\,\cancel{(3a-2b)}}=\dfrac{a}{2b}$

10. a) $2(3x+3)=6x+6$ a.e.
b) $3(8-y)=24-3y$ a.e.
c) $4(2a+3b)=8a+12b$ a.e.

11. a) $y=x^2-2$ b) $y=-x^2+4x+3$

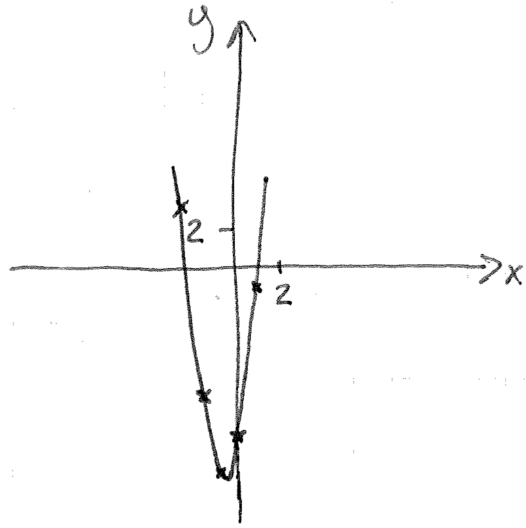
x	y
-3	7
-2	2
-1	-1
0	-2
1	-1
2	2
3	7

x	y
-2	-9
0	3
2	7
4	3
6	-9



12. a) $f(x) = 3x^2 + 5x - 9$

x	$f(x)$
-3	$3 \cdot 9 - 15 - 9 = 3$
-2	$3 \cdot 4 - 10 - 9 = -7$
-1	$3 \cdot 1 - 5 - 9 = -11$
0	-9
1	$3 + 5 - 9 = -1$



Vi ser att funktionen har ett minsta värde som är negativt, då har den två nollställen

(dvs två x-värden där $f(x) = 0$)

b) $3x^2 + 5x - 9 = 0$ är samma sak som $f(x) = 0$.

Enligt a) har alltså ekvationen två lösningar.

13. $(2x+5)^2 = 4x^2 + 20x + 25$ enligt första kvadreringsregeln.

Mie har glömt den dubbla produkten; $2 \cdot 2x \cdot 5 = 20x$.

16. a) $(2a+b)^2 - 4ab = 4a^2 + 4ab + b^2 - 4ab = \underline{\underline{4a^2 + b^2}}$

b) $(5a-3b)^2 + (5a-3b)(5a+3b) =$

$= (25a^2 - 30ab + 9b^2) + (25a^2 - 9b^2) =$

$= 25a^2 - 30ab + \cancel{9b^2} + 25a^2 - \cancel{9b^2} =$

$= \underline{\underline{50a^2 - 30ab}}$

16. c) $(3x+2y)^2-(3x+2y)(2y-3x)=$
$=(9x^2+12xy+4y^2)-(2y+3x)(2y-3x)=$
$=9x^2+12xy+4y^2-(4y^2-9x^2)=$
$=9x^2+12xy+\cancel{4y^2}-\cancel{4y^2}+9x^2=$
$=\underline{\underline{18x^2+12xy}}$

17. a) $(80+1)^2=6400+160+1=6561$

b) $(90+2)^2=8100+360+4=8464$

18. a) $2x(3x+8)=6x^2+16x$ a.e.
d) $(2a-b)(a+b)=2a^2+2ab-ab-b^2=$
$=\underline{\underline{2a^2+ab-b^2}}$ a.e.

21. a) $\frac{9x+6x^2}{6x}=\frac{\cancel{3x}(3+2x)}{\cancel{3x}\cdot 2}=\frac{3+2x}{2}$

b) $\frac{2a^2-4ab}{3a-6b}=\frac{2a(a-2b)}{3(a-2b}=\frac{2a}{3}$

c) $\frac{x^2-4y^2}{x+2y}=\frac{(x+2y)(x-2y)}{x+2y}=\underline{\underline{x-2y}}$

d) $\frac{4a^2-12a+9}{4a-6}=\frac{(2a-3)^{\cancel{2}}}{2\cancel{(2a-3)}}=\frac{2a-3}{2}$

23. a) $2{,}5(4x-2)-0{,}5(6x-10)=$
$=(10x-5)-(3x-5)=$
$=10x-5-3x+5=\underline{\underline{7x}}$

b) $\frac{3}{4}(4a-12b+4)-\frac{2}{3}(12-9a+3b)=$
$=(3a-9b+3)-(8-6a+2b)=$
$=3a-9b+3-8+6a-2b=\underline{\underline{9a-11b-5}}$

24. a) $\frac{x^2+6x+9}{9-x^2} = \frac{(x+3)^2}{(3+x)(3-x)} =$

$= \frac{(x+3)^{\cancel{2}}}{\cancel{(x+3)}(3-x)} = \underline{\underline{\frac{x+3}{3-x}}}$

b) $\frac{y^2-49}{y^2-14y+49} = \frac{(y+7)\cancel{(y-7)}}{(y-7)^{\cancel{2}}} = \underline{\underline{\frac{y+7}{y-7}}}$

25 Givet: $h(t) = 50t - 5t^2$

t = tiden i s efter uppskjutningen

$h(t)$ = kulans höjd i m efter t s.

a) Sökt: $h(1,5) = ?$

$h(1,5) = 50 \cdot 1,5 - 5 \cdot 1,5^2 =$

$= 75 - 11,25 = 63,75 \text{ m} \approx \underline{\underline{64 \text{ m}}}$

b) Sökt: h_{max}, dvs vändpunkten som alltid ligger på symmetrilinjen.

Hitta först nollställena.

$h(t) = 50t - 5t^2 = \{\text{faktorisera}\} =$

$= 5t(10-t)$

$h(t) = 0$ då $5t = 0$, dvs $t = 0$

eller $10 - t = 0$, dvs $t = 10$

Detta ger vändpunkt då $t = 5$

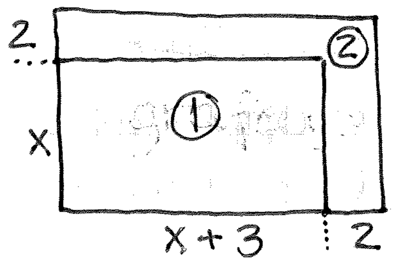
$h(5) = 50 \cdot 5 - 5 \cdot 5^2 = 250 - 125 = \underline{\underline{125 \text{ m}}}$

25. c) $\underline{\underline{10\,s}}$ dvs när $h(t)=0$ igen, se b)-uppgiften.

d) Sökt: $t = ?$ då $h(t) = 80\,m$

Görs lämpligen med grafräknare.

26.



Area 2 $= 20\,m^2$

Givet: Se ovan

Sökt: Totala arean, dvs 1 + 2

Area 2: $2x + 2(x+3+2) = 20$

$$2x + 2(x+5) = 20$$
$$2x + 2x + 10 = 20$$
$$4x + 10 = 20 \qquad (-10)$$
$$4x = 10 \qquad (\div 4)$$
$$\underline{\underline{x = 2{,}5\ m}}$$

Area 1 : $x(x+3) = \{x = 2{,}5\} =$

$$= 2{,}5(2{,}5+3) = 2{,}5 \cdot 5{,}5 =$$
$$= 13{,}75\,m^2$$

Totalt: 1 + 2 $= 13{,}75 + 20 = 33{,}75 \approx$

$$\approx 34\,m^2$$

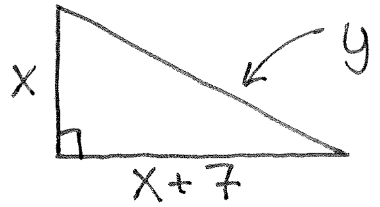
Svar: Arean är ca $\underline{\underline{34\,m^2}}$

28. a) $\dfrac{(a+2b)^2}{3a+6b} = \dfrac{(a+2b)^{\cancel{2}}}{3\cancel{(a+2b)}} = \dfrac{a+2b}{3}$

b) $\dfrac{4m^2-4mn+n^2}{12m^2-3n^2} = \dfrac{(2m-n)^2}{3(4m^2-n^2)} =$

$= \dfrac{(2m-n)^{\cancel{2}}}{3(2m+n)\cancel{(2m-n)}} = \dfrac{2m-n}{3(2m+n)}$

29.



[cm]

a) $A = \dfrac{b \cdot h}{2} = \dfrac{(x+7)x}{2} = \dfrac{x^2+7x}{2}$ cm²

b) Pythagoras sats:

$y^2 = x^2 + (x+7)^2$

$y = \sqrt{x^2 + (x+7)^2}$

$y = \sqrt{x^2 + x^2 + 14x + 49}$

$y = \sqrt{2x^2 + 14x + 49}$ cm