Changing the Subject

GCSE MATHS

Name: _____

Teacher: _____
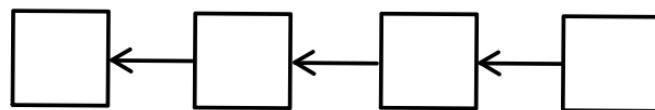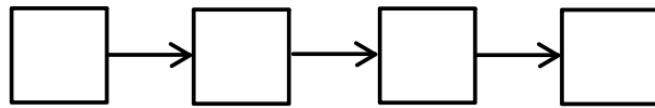
Learning objectives

By the end this pack you will be able to:

**1) Rearrange a formula to make X the subject**
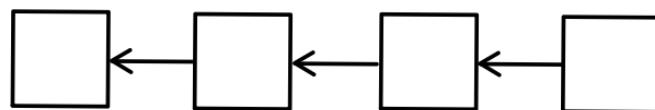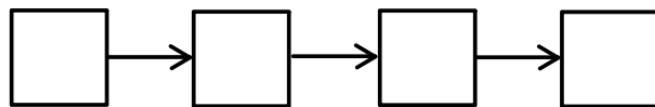
Changing the subject

1) y = 3m + 2

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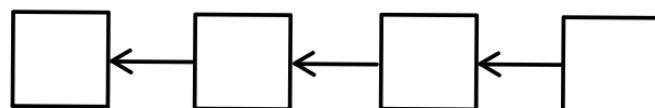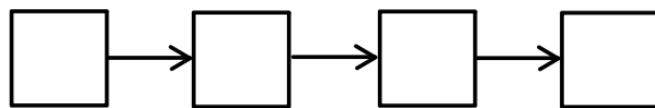
m =

2) j = 4h − 9

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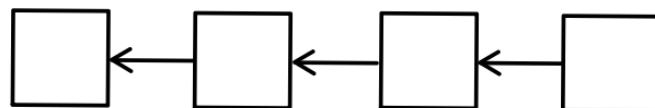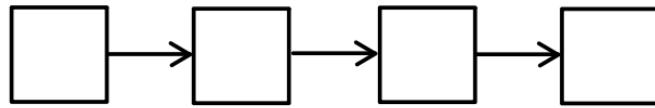
h =

3) $t = \dfrac{r}{4} + 5$

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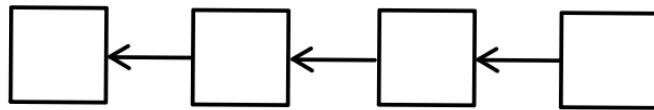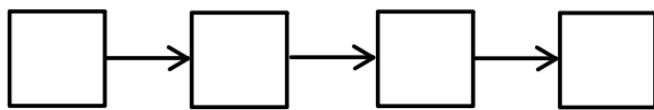
r =

4) $w = \dfrac{y-8}{2}$

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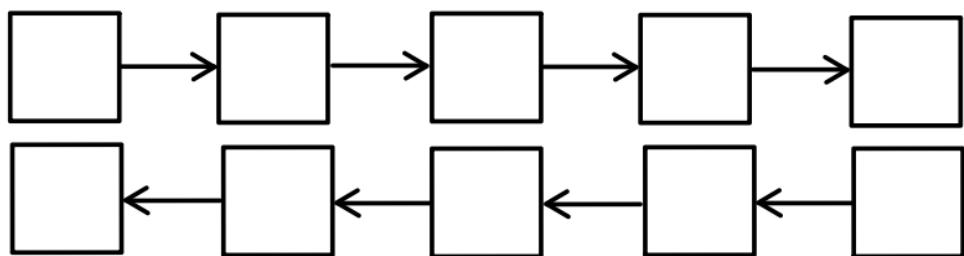
y =

5) f = 4(p − 7)

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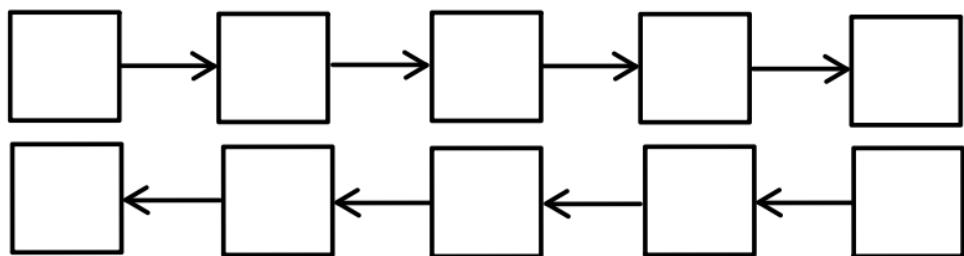
p =

6) y = 5(m + 3)

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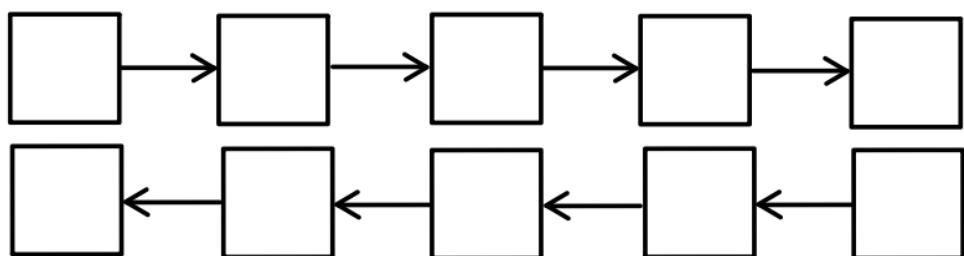
m =

7) $n = \dfrac{5m+3}{4}$

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m =

8) $m = \dfrac{6(n-2)}{3}$

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n =

Changing the Subject of the Formula

Make y the subject of the formula and show all your workings.

1) $5y - 6 = 4$

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....

2) $dy + g = T$

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3) $d(y + m) = c$

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4) $y^2 + x = r$

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5) $\sqrt{y - g} = 8$

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6) $k = h - \dfrac{y}{g}$

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7) $\dfrac{e}{y^2} + f = L$

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8) $\dfrac{4y^2 + m}{d} = s$

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Make x the subject (Easy)

a) $x + b = c$

b) $x - c = f$

c) $2x + 4 = f$

d) $ax + b = c$

e) $4x - f = g$

f) $3x + a = 2x + b$

Make x the subject (slightly harder)

a) $\frac{x+3}{2} = a$

b) $\frac{x}{2} + 3 = b$

c) $2(x + a) = b$

d) $\frac{x-b}{2} = a$

e) $\frac{x}{a} - c = b$

f) $\frac{x+a}{d} - c = b$

Make x the subject – x occurs twice: (Once all the x's are on one side you must factorise out x)

a) $ax + bx = c$

b) $ax - bx = d$

c) $ax = x + d$

d) $ax + b = cx + d$

e) $ax - d = bx + c$

f) $ax - b = c - 2x$

Make x the subject – isolate the square or square root first:

a) $x^2 + 4 = a$

b) $x^2 - d = c$

c) $(x + 2)^2 = b$

d) $\sqrt{x + a} = b$

e) $\sqrt[3]{x} + b = c$

f) $a\sqrt{x} - b = c$

Answers:

1a) x = c-b,

b) x = f + c

c) $x = \frac{f-4}{2}$

d) $x = \frac{c-b}{a}$

e) $x = \frac{g+f}{4}$

f) x = b −a

2a) x = 2a − 3

b) $x = 2b - 6$

c) $x = \frac{b-2a}{2}$

or $x = \frac{b}{2}$- a

d) $x = 2a + b$

a

e) x = a(b + c)

f) x = d(b+c) −

3a) $x = \frac{c}{a+b}$

b) $x = \frac{d}{a-b}$

c) $x = \frac{d}{a-1}$

d) $x = \frac{d-b}{c-a}$

e) $x = \frac{c+d}{a-b}$

f) $x = \frac{c+b}{a+2}$

4a) $x = \sqrt{a-4}$

b) $x = \sqrt{c+d}$

c) x=$\sqrt{b} - 2$

d) x = b² −a

e) x = (c - b)³

f) $x = \left(\frac{b+c}{a}\right)^2$

Make x the subject:

1. $x + b = e$

2. $x - t = m$

3. $x - f = a + b$

4. $x + h = A + B$

5. x + t = y + t

6. a + x = b

7. k + x = m

8. v + x = w + y

Make x the subject:

1. $y = 8x$

2. $y = 7x$

3. $ax = b$

4. $hx = m$

5. mx = a + b

6. kx = c − d

7. vx = e + n

8. 3x = y + z

9. xp = r

The subject is in brackets next to each formula

1. $a = 2b - 5$ (b)

2. $p = 9q + 7$ (q)

3. $a = 7b + 1$ (b)

4. $x = 3y - 10$ (y)

5. $y = 6x - 5$ (x)

6. $y = 8x - 10$ (x)

7. $y = px + q$ (x)

8. $y = cx - h$ (x)

9. $y = rx - 2p$ (x)

Make x the subject:
(Hint: multiply the bracket out first.)

1. $a(x - b) = c$

2. $c(x - d) = e$

3. $m(x + m) = k$

4. $k(x - a) = t$

5. $h(x - h) = k$

6. $m(x + b) = n$

7. $a(x - a) = a^2$

8. $c(a + x) = d$

9. $m(b + x) = e$

Make x the subject:

1. $\dfrac{x}{t} = m$

2. $\dfrac{x}{e} = n$

3. $\dfrac{x}{p} = a$

4. $am = \dfrac{x}{t}$

5. $bc = \dfrac{x}{a}$

6. $e = \dfrac{x}{y^2}$

7. $\dfrac{x}{a} = (b + c)$

8. $\dfrac{x}{t} = (c - d)$

Make x the subject:

1. $\dfrac{bx+3c}{y} = p$

2. $\dfrac{ax-r}{5} = q$

3. $y = \dfrac{cx-2d}{7}$

4. $y = \dfrac{ax - 3c}{b}$

5. $\dfrac{px + qr}{8} = y$

6. $\dfrac{px + 2h}{c} =$

USING BIG SCIENTIFIC EQUATIONS

Change the subject of each of these famous scientific formulae for all the possible algebraic variables (/constants).

$$E = mc^2$$

$$s = vt - \frac{1}{2}at^2$$

$$F = \frac{GMm}{r^2}$$

USING BIG SCIENTIFIC EQUATIONS

Change the subject of each of these famous scientific formulae for all the possible algebraic variables (/constants).

$$v = u + at$$

$$v^2 = u^2 + 2as$$

$$T = 2\pi\sqrt{\frac{l}{g}}$$

Homework Exam Questions

Q1.

Make h the subject of the formula $x = 5h + 8$

....

(Total for Question is 2 marks)

Q2.

(a) Expand $\quad 3(2y - 5)$

. . . .

(1)

(b) Factorise completely $\quad 8x^2 + 4xy$

. . . .

(2)

(c) Make h the subject of the formula $\quad t = \frac{gh}{10}$

$h = $ . . . .

(2)

(Total for Question is 5 marks)