##  <br> EXAM PAPERS PRACTICE

## GCSE AQA Math 8300

Notation Vocabulary \& Manipulation

## Mark Scheme

"We will help you to achieve A Star "

M1. $(x-3)(x+3)$
Substitutes any value for $x$ into both expressions but not $x=0$

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

Sets up a correct equation in $b$

$$
(b=) 2 \text { or } x^{2}+2 x-15
$$

M2.
(a) $(c+4)(c+1)$ or $3(c+1)$

Correct factorisation
$\frac{(c+4)(c+1)}{3(c+1)}=\frac{c+4}{3}$
Must be a fraction and completed to $\frac{c+4}{3}$

Correctly converts to a common denominator

$$
\begin{aligned}
& \text { e.g. } 1 \frac{2(c+4)}{6}+\frac{3-2 c}{6} \\
& \text { e.g. } 2 \frac{6(c+4)}{18}+\frac{3(3-2 c)}{18} \\
& M 2 \frac{2 c}{6}+\frac{8}{6}+\frac{3}{6}+\frac{2 c}{6}
\end{aligned}
$$

(b) Correctly expands their brackets (must have common denominator)
$\frac{2 c+8+3-2 c}{6}$ or
$\frac{2 c+8}{6}+\frac{3-2 c}{6}$
Allow M1 if their first line of working is

$$
\frac{2 c+4+3-2 c}{6} \text { or } \frac{2 c+4}{6}+\frac{3-2 c}{6}
$$

$$
\begin{aligned}
& \frac{11}{6} \text { or } 1 \frac{5}{6} \text { or } 1.833(\ldots .) \\
& \frac{33}{18} \mathrm{~A} 0 \frac{5.5}{3} \mathrm{~A} 0 \frac{8+3}{6} \mathrm{~A} 0
\end{aligned}
$$

## Alternative method

Correctly converts to a common denominator

$$
\text { e.g. } \frac{6\left(c^{2}+5 c+4\right)}{6(3 c+3)}+\frac{(3-2 c)(3 c+3)}{6(3 c+3)}
$$

oe
May also expand the denominator
Correctly expands their brackets (must have common denominator)

$$
\begin{aligned}
& \frac{6 c^{2}+30 c+24+9 c+9-6 c^{2}-6 c}{6(3 c+3)} \text { or } \\
& \frac{6 c^{2}+30 c+24}{6(3 c+3)}+\frac{9 c+9-6 c^{2}-6 c}{6(3 c+3)} \\
& \text { oe } \\
& \text { May also expand the denominator }
\end{aligned}
$$

$$
\begin{aligned}
& \frac{11}{6} \text { or } 1 \frac{5}{6} \text { or } 1.833(\ldots .) \\
& \frac{33}{18} \mathrm{~A} 0 \frac{5.5}{3} \mathrm{~A} 0 \frac{8+3}{6} \mathrm{~A} 0
\end{aligned}
$$

M3. $\quad c^{2}=16$ or $c=4$ or $c=-4$

$$
\begin{aligned}
& 3 x^{2}+3 c x+c x+c^{2}\left(=3 x^{2}-d x+16\right) \\
& 3 x^{2}+12 x+4 x+16 \text { or } 3 x^{2}-12 x-4 x+16 \text { oe }
\end{aligned}
$$

$$
\begin{gathered}
c=4 \text { and } c=-4 \text { or } 4 c=-d \text { or } 16=-d \text { or }-16=-d \\
\text { oe }
\end{gathered}
$$

$$
c=4 \text { and } d=-16 \text { or } c=-4 \text { and } d=16
$$

One pair of answers orall four answers seen but not paired

$$
\begin{aligned}
& c=4 \text { and } d=-16 \text { and } c=-4 \text { and } d=16 \\
& \quad \begin{array}{l}
\text { Both pairs of answers must be correctly paired } \\
\text { SC3 for one correct pair or both correct pairs or all four } \\
\text { answers seen but not paired from no working }
\end{array}
\end{aligned}
$$

M4.

## Alternative method 1

$$
x-5 \text { or } x-7 \quad \text { or }
$$

$$
x+5 \text { or } x+7
$$

Any letter

$$
x+x-5+x-7 \quad \text { or } \quad 3 x-12
$$

$3 x-12=3(x-4) \quad$ or
$3 x+12=3(x+4)$
Strand (ii)
Correct algebra throughout and showing that their total is a multiple of 3

## Alternative method 2

$x+5$ or $x-2 \quad$ or
$x-5$ or $x+2$
Any letter
$x+x+5+x-2$ or $3 x+3$

$$
\begin{aligned}
& 3 x+3=3(x+1) \quad \text { or } \\
& 3 x-3=3(x-1)
\end{aligned}
$$

Strand (ii)
Correct algebra throughout and showing that their total is a multiple of 3

## Alternative method 3

$$
\begin{aligned}
& x+7 \text { or } x+2 \quad \text { or } \\
& x-7 \text { or } x-2
\end{aligned}
$$

Any letter

$$
x+x+7+x+2
$$

$$
\begin{aligned}
& 3 x+9=3(x+3) \quad \text { or } \quad 3 x+9 \\
& 3 x-9=3(x-3)
\end{aligned}
$$

Strand (ii)
Correct algebra throughout and showing that their total is a multiple of 3

M5.(a) $\quad(C=) 15 x+20 y$

$$
\begin{aligned}
& \text { or }(C=5(3 x+4 y) \\
& \qquad \begin{array}{l}
\text { Accept } 0.15 x+0.2 y \\
\\
\text { B1 for one correct term } \\
\\
\text { Do not ignore further work } \\
\\
\text { Do not accept } x 15+y 20
\end{array}
\end{aligned}
$$

(b) $150 \times 15$ or $90 \times 20$
$150 \div 5$ and $90 \div 5$
or $150 \times 0.15$ or $90 \times 0.20$
$150 \div 5$ or $90 \div 5$
or $15 \div 5$ or $20 \div 5$
$150 \times 15$ and $90 \times 20$
or $150 \times 0.15$ and $90 \times 0.20$ or $15 \div 5$ and $20 \div 5$
or 2250 and 1800
or 4050

$$
\text { or } 30 \text { and } 18
$$

or 22.5 and 18
or 40.5

```
or 3 and 4
```

$4050 \div 5$
or 810
$30 \times 15$ and $18 \times 20$
or 450 and 360
or 810
or $40.50 \div 5$
or 8.10
or 120 and 72
$150 \times 3$ and $90 \times 4$
or 450 and 360
or 810
or 12 and 16

4050-810
or $40.50-8.10$
or $4050 \div 5 \times 4$
or $40.50 \div 5 \times 4$
$150 \times 12+90 \times 16$
or $1800+1440$
or 3240
32.40

M6.(a) $2 a+6+5 a-5$

$$
\text { or } 7 a+c \text { or } \mathrm{n} a+1
$$

Allow one error

$$
7 a+1
$$

Do not accept further work
(b) $5 c^{6} d^{5}$

B1 for two correct terms
(c) $\frac{2(x-3)}{x+3}$ or $\frac{2 x-6}{x+3}$

B1 for $\frac{2(x-3)^{2}}{(x-3)(x+3)}$ or $\frac{8(x-3)}{4(x+3)}$ or $\frac{2(x-3)}{1(x+3)}$
Do not accept further work

M7.Sight of correct common denominator oe eg $2 x^{2}$
eg $2 x$
any common multiple of 2 and $x$
$\frac{11}{2 x}-\frac{6}{2 x}$
oe eg $\frac{11 x}{2 x^{2}}-\frac{6 x}{2 x^{2}}$
$\frac{5}{2 x}$

M8.(a) $\quad 9 x+6 y$
B1 for each term
Do not ignore fw
(b) $4 x+12$

Do not ignore fw
(c) $x(x-5)$

Do not ignore fw
[4]

M9.n + 18
or $18 \div 2$ or 9
or $45 \times 2$
Tries two numbers with a difference of 18 or tries two numbers with a sum of 90
$n+n+18$ or $n+9$
or $45-9$ or $45+9$
or their $90-18(=72)$
or their $90+18(=108)$
oe
Different trial
$n+n+18=90$ or $n+9=45$
or $45-9$ and $45+9$
or their $72 \div 2$
or their $108 \div 2$
oe
3rd trial

Amy 36
36 and 54 in any order

Chris 54
(a) $216 \div 4=54$ or $4 \times 54=216$ or $216 \div 54=4$
(b) $x-5$ or $x+8$

$$
x+x-5+x+8=54
$$

oe eg all multiplied by 4
condone one error or omission.

$$
\begin{aligned}
3 x=51 & \text { or } \\
& x+1=18 \\
& \text { Simplifying their linear equation }
\end{aligned}
$$

$x=17$
£68
ft their $17 \times 4$ where their 17 is a number of hours.

```
Alternative 1 (hours)
Two numbers (hours) with a difference of 5 or 8 seen
A set of 3 numbers fitting x,x-5 and x+8
    x\not=54
Their 3 numbers tested against 54
    Dep on previous M1
    Total must be seen
1 7
£68
ft their \(17 \times 4\) where their 17 is a number of hours.
```


## Alternative 2 (money)

Two amounts with a difference of 20 or 32 seen

A set of 3 amounts fitting $x, x-20$ and $x+32$

Their 3 amounts tested against 216
Dep on previous M1
Totals must be seen

An improved set of three numbers (closer to total of 216)
Totals must be seen
£68

Alternative 3 (combined hours and money)
Two numbers (hours) with a difference of 5 or 8 seen

$$
x \neq 54
$$

Their hours each multiplied by 4 and total tested against 216
Dep on previous M1
Totals must be seen

An improved set of three numbers (closer to total of 216)
Totals must be seen
£68

M11(a) $4 x$
(b) $y^{3}$
(c) $b+a$

M12. ( $\mathrm{Bag} \mathrm{B}=$ ) $3 n$ oe
Accept other letter used

$$
\begin{aligned}
& (\mathrm{Bag} \mathrm{C}=) n+14 \text { oe } \\
& \text { Accept other letter used }
\end{aligned}
$$

```
their 3n= their }n+1
Consistent use of letter on both sides
```

7
With B2 awarded
SC1 correct answer without B2 awarded

M13.

$$
6 c\left(c^{2}+5\right) \text { or } 3\left(c^{2}+5\right)
$$

$$
\frac{6 c\left(c^{2}+5\right)}{3\left(c^{2}+5\right)}
$$

This mark implies first M1
$2 c$ and multiple of 2 so even
oe statement
Must see method

M14.
(a) $(n-6)^{2}$ could be zero (so she is wrong) or
The sixth term is 1
oe
(b) 1

M15.
Alternative method 1
$4 x^{2}+6 x y+6 x y+9 y^{2}$
or $4 x^{2}-6 x y-6 x y+9 y^{2}$
Four terms, three correct with a term in $x^{2}$ and a term in $y^{2}$
or $4 x^{2} \pm 12 x y+a y^{2}$ with $a \neq 0$
or $b x^{2} \pm 12 x y+9 y^{2}$ with $b \neq 0$
$4 x^{2}+12 x y+9 y^{2}-\left(4 x^{2}-12 x y+9 y^{2}\right)$
or $4 x^{2}+12 x y+9 y^{2}-4 x^{2}+12 x y-9 y^{2}$
oe
allow one error, which may be missing brackets
$24 x y=360$
oe
$x y=15$ (and 15 is a multiple of 5)

## Alternative method 2

$(2 x+3 y+2 x-3 y)(2 x+3 y-(2 x-3 y))$
or
$(2 x+3 y+2 x-3 y)(2 x+3 y-2 x+3 y)$
allow one error, which may be missing brackets
their $4 x \times$ their $6 y$
Correct simplification of both of their brackets and intention to multiply
$24 x y=360$
oe
$x y=15$ (and 15 is a multiple of 5)

## Additional Guidance

Missing brackets in Alt 1 for second method mark may be recovered for M3 or M3A1

