



Q	Answer	Marks
1	$MN = \frac{1}{2}(b - a) = \frac{1}{2}AB$, so MN is a scalar multiple of AB and the lines are parallel	4
2	$DC = -CD = 4a + 2b = AB$, so AB and DC are equal and parallel, which proves ABCD is a parallelogram	4
3	$GH = \frac{3}{2}EF$, so GH is a scalar multiple of EF and the lines are parallel	4
4	$QR = 3PQ$, so PQ and QR are parallel; they share the point Q, so P, Q and R are collinear	4
5	a) $MN = 2b - a$ b) If $2b - a = k(3b - 2a)$ then $k = 1/2$ from the a terms and $k = 2/3$ from the b terms; these are different, so MN is not parallel to AB	5
6	$MX = \frac{1}{2}a$ and $XD = \frac{1}{2}a$, so $MX = XD$; the segments are parallel and share the point X, so M, X and D are collinear	5
7	a) $AB = 4a + 8b$ b) $OP = 7a + 9b$ c) $OD = 14a + 18b = 2(7a + 9b) = 2OP$, so OD is a scalar multiple of OP; both pass through O, so O, P and D are collinear	5
8	11	5
9	a) $AP = -(2/3)a + (1/3)b$ and $AN = -a + (1/2)b = (3/2)AP$, so AN is a scalar multiple of AP; both pass through A, so A, P and N are collinear b) 2 : 1	5
10	a) $AB = 3b - 3a$ b) $OP = OA + (1/3)AB = 3a + b - a = 2a + b$ c) 1 : 2	6
11	$MN = (-\frac{1}{2})(b - a) = (-\frac{1}{2})AB$, so MN is parallel to AB	3
12	$(\frac{1}{3})a + (\frac{2}{3})b$	4
13	$(\frac{3}{2})a + (\frac{1}{2})c$	4

Full worked solutions, written out by hand, are on the solutions sheet for this topic.