



Trainer pack

# **Developing functional mathematics with vocational learners**

## **Module 12d: Training the trainers**

**Course information**

**Length of session:** Approximately 5 hours, depending on activities required by participants. Trainers can customise, shorten and lengthen the session to suit the audiences and settings.

**Audience**

**Job roles:** Practitioners who are vocational specialists and teaching or supporting the development of numeracy skills or functional mathematics up to and including Level 2.

**Sector / setting:** Vocational

**Links to other modules**

**12d Developing functional mathematics with vocational learners: Training the trainers**

The module is intended as a preparation for trainers who are intending to deliver Modules 12a-c to staff in their organisations:

**Module 12a: Handling data**

**Module 12b: Number concepts and skills**

**Module 12c: Common measures**

Each of these modules is linked to one aspect of the adult numeracy core curriculum and uses examples and discusses issues concerning how curriculum content might be applied to the needs of vocational learners studying functional mathematics.

Module 12d takes a more strategic approach. It provides an overview of Modules 12a-c, with a view to adapting them for different cohorts and different CPD contexts. It also offers the opportunity to explore some of the training needs and issues of staff who develop functional maths with vocational learners and to consider how to address these.

## **Aims**

To assist trainers and managers in working with a range of teachers to develop the functional mathematics skills of vocational learners

To consider how existing training modules might be customised and adapted for different cohorts and contexts.

## **Outcomes**

By the end of the session participants will have:

- shared and discussed some training needs and issues relating to vocational staff whose role involves teaching functional maths to vocational learners;
- experienced sample activities from each of Modules 12a, 12b and 12c, and reflected on the content in relation to their own professional contexts;
- considered how to adapt the content of Modules 12a, 12b and 12c for their own contexts and how to follow up and consolidate the module content; and
- identified what further content could be included in CPD sessions for those responsible for developing the numeracy skills of vocational learners.

## Module overview

Activity		Content
1	<b>Starter: Modelling a numeracy starter</b>	Transport to work: participants collaborate to generate data using a functional skills approach, then reflect on the purpose of starter activities.
2	<b>Introductions</b>	Trainer introduces the aims and outcomes for the day, and participants introduce themselves and their expectations for the day.
3	<b>Issues and training needs</b>	Participants share and discuss some training needs and issues relating to the teaching and learning of functional maths for vocational learners.
4	<b>Overview of the modules</b>	Participants gain an overview of the three modules: <i>Developing functional mathematics with vocational learners</i> .
5	<b>Module 12a</b>	Participants are introduced to the content of Module 12a: <i>Handling data</i> , then experience and reflect on an activity from the module, and how it might be adapted.
6	<b>Module 12b</b>	Participants are introduced to the content of Module 12b: <i>Number concepts</i> , then experience and reflect on an activity from the module, and how it might be adapted.
7	<b>Module 12c</b>	Participants are introduced to the content of Module 12c: <i>Common measures, shape and space</i> , then experience an activity from the module, and reflect on some implications for developing functional maths with vocational learners.
8	<b>Further sources of CPD activity</b>	A brief overview of other maths-related CPD modules and qualifications that may be relevant to vocational teachers' needs.
9	<b>Planning CPD sessions</b>	Participants consider how to adapt the content of Modules 12a, 12b and 12c for their own contexts and how to follow up and consolidate the module content. Participants also identify wider CPD that might be relevant to their organisation.
10	<b>Summary</b>	Reflecting on what has been learned and evaluate the session.

## Trainers

<b>Trainer experience or qualifications required</b>	Fully qualified numeracy / maths teacher (Cert Ed / PGCE or equivalent, plus numeracy subject specialist qualification); preferably Level 3 or above maths qualification; previous experience of delivering staff CPD.
<b>Reference material for trainers</b>	Trainer notes  Trainers should also be familiar with the content of the trainer packs for Modules 12a, 12b and 12c.

## Resources

<b>Resources for reference during the session</b>	Trainer notes Copies of trainers packs for Modules 12a, 12b and 12c
<b>Pre-course activity for participants (see HO 2)</b>	<p>Participants should familiarise themselves with the content of Modules 12a, 12b and 12c.</p> <p>Participants need to collect information from their organisation (see <b>HO 2</b>) to identify the roles and training needs of those staff who teach or support functional mathematics skills with vocational learners. This may involve:</p> <ul style="list-style-type: none"><li>• <b>Talking to vocational and specialist maths / numeracy staff</b> about the challenges they encounter in teaching and supporting functional mathematics with vocational learners, and what types of training and support would help them.</li><li>• <b>Talking to managers</b> about issues facing the organisation in relation to functional maths, and any relevant strategic or operational plans.</li><li>• <b>Talking to those responsible for lesson observation</b> (and / or reading summaries of observation reports) and identifying any issues that have been raised with regard to functional maths.</li><li>• <b>Talking to vocational learners</b> about how well they feel supported in developing their numeracy skills, and what might help them further.</li></ul> <p>Participants should bring with them examples of</p>

functional maths assessment papers from their organisation's examining body.

### Useful websites

See **HO 5**: Useful websites and sources of information.

### Before the session the trainer needs to:

Email copies of trainer packs (and related PowerPoint files) for Modules 12a, 12b and 12c **at least a week before the event**. Remind participants to bring their copies with them, if possible.

Email the pre-course task to the participants **at least a week before the event (see HO 2)**. Remind participants to bring the results of this task with them to the CPD session.

Prepare Participant packs which contain copies of the handouts but not the resources and PowerPoint slide notes. Note that HO 4 is a pdf and needs to be downloaded and printed for addition to the Participant packs. See TN 8 below for link.

Ensure there are mini-whiteboards and marker pens for each participant. These can be easily and reasonably ordered from the internet (just search for mini whiteboard). Alternatively (but not so easy to wipe clean) they can be made by laminating A4 sheets of coloured / white paper or card.

Arrange for an internet link in order to look at the LSIS CPD modules site (see TN 8 below):  
<http://www.excellencegateway.org.uk/node/21277>

Have a few spare copies of the Trainer packs for Modules 12a, 12b and 12c, in case participants do not have their copies with them.

Bring examples of functional skills assessment questions – see TN 7b below for details.

TN 1: mini whiteboards and marker pens.

TN 3: participants need to refer to the notes they have made for HO 2, as distributed prior to the event.

TN 5b: carousel of data handling activities. Prepare the resources according to instructions in TN 5b or on the resources.

TN 6b: the following resources are required:

- a piece of string about 5 metres in length
- a pile of blank pieces of paper, about A6 size is good
- a supply of paper clips, dressmaking pins, or clothes pegs.

TN 7b: whilst participants have been asked to bring samples of functional skills assessment papers to the training, it would be sensible to acquire copies of a functional skills exam question where the focus is on measures, shape and space. Ideally this would be from the examining board(s) used by participants' organisations.

TN 8: download and print copies of the overview of LSIS CPD programmes:

<http://www.excellencegateway.org.uk/node/21277> as a handout - HO 4. Ideally you would be able to link to the website during the session, showing participants exactly where to find the resources.

## Session plan

### Aims

To assist trainers and managers in working with a range of teachers to develop the functional mathematics skills of vocational learners

To consider how existing training modules might be customised and adapted for different cohorts and contexts.

### Outcomes

By the end of the session participants will have:

- shared and discussed some training needs and issues relating to vocational staff whose role involves teaching functional maths to vocational learners;
- experienced sample activities from each of Modules 12a, 12b and 12c, and reflected on the content in relation to their own professional contexts;
- considered how to adapt the content of Modules 12a, 12b and 12c for their own contexts and how to follow up and consolidate the module content; and

- identified what further content could be included in CPD sessions for those responsible for developing the numeracy skills of vocational learners.



Suggested timings are for guidance purposes only. Trainers should adapt content to meet the needs and experience levels of the participants.

**TN – trainer notes    HO – handout    R – resources    PPT - PowerPoint**

Time	Content	Resources		
		No.	Style	Title
20m	<p><b>TN 1. Starter: Modelling a numeracy starter</b></p> <p>Using <b>PPT 2</b>, ask participants to identify the main form of transport they use to travel to work, then group themselves accordingly.</p> <p>Next, ask each participant to display the data on their own mini-whiteboard (or alternative), using whatever representation they see fit. Pairs then compare their representations. Bar charts will mainly be produced – discuss essential aspects of a bar chart, e.g. title, labels, scales, clear messages.</p> <p>Get pairs to write a statement about their findings on modes of transport to work.</p> <p>Ask participants questions about the data to emphasise the purpose of data handling, e.g.</p> <ul style="list-style-type: none"> <li>• Who might want to know this sort of information?</li> <li>• What other information might they want to know?</li> </ul> <p>Emphasise how functional maths is used to solve problems – it is about applying maths to the real world.</p> <p>Ask participants what sorts of data their learners need to collect and analyse and for what purpose.</p> <p>Discuss how to adapt data collection to another context to make it easier or harder.</p> <p><b>Reflection</b> Explain that participants have just completed a starter activity taken from Module 12a. Using <b>PPT 3</b>, ask for their reactions – was this a good starter activity? Why / why not? In pairs / small</p>	PPT 2	Slide	Transport to work
		PPT 3	Slide	Starter activities

Time	Content	Resources		
		No.	Style	Title
(Total 25m)	<p>groups, ask them to discuss:</p> <ul style="list-style-type: none"> <li>What is the purpose of a starter activity?</li> <li>What makes an effective starter activity?</li> </ul> <p>Take feedback and highlight key points.</p>			
10m	<p><b>TN 2. Introductions</b></p> <p>Using <b>PPT 4-5</b>, outline the aims and objectives for the day – draw participants' attention to <b>HO 1</b>.</p> <p>Ask participants to introduce themselves,</p> <ul style="list-style-type: none"> <li>Their role, the context in which they work and</li> <li>What they would like to gain from the day</li> </ul>	PPT 4-5	Slides	Aims and outcomes
(Total 35m)		HO 1	Handout	Aims and outcomes
30m	<p><b>TN 3. Issues and training needs</b></p> <p>Refer learners to the pre-course task, using <b>PPT 6</b> as a focus, and draw their attention to <b>HO 2</b> in the Participant pack (as a reminder). Fuller instructions are in TN 3 below.</p> <p>In small groups, ask participants to share and discuss some staff training needs and issues relating to functional mathematics for vocational learners, based on their pre-course task.</p> <ul style="list-style-type: none"> <li>In what ways are these needs different for vocational teachers, numeracy specialists, assessors, etc?</li> </ul> <p>Work in small groups and then take feedback and record on a flipchart. Try to categorise the issues / training needs. Are there any patterns / differences?</p> <p>Highlight those issues that are the dealt with in Modules 12a, 12b and 12c, but also mention other CPD modules that will be summarised later in the session (e.g. relating to teachers' personal maths competence).</p>	PPT 6	Slide	Issues and training needs
(Total 1h 5m)		HO 2	Handout	Staff training needs analysis (pre-course task)
10m	<b>TN 4. Overview of the modules</b>			

Time	Content	Resources		
		No.	Style	Title
(Total 1h 15m)	<p>Ask if anyone has attended or delivered any of Modules 12a-c.</p> <p>Talk through <b>PPT 7-8</b>. Respond to any questions that arise.</p> <p>Refer to trainer packs for Module 12a, 12b and 12c available – 1 copy per 3-4 participants. <i>(Personal copies should have been sent electronically in advance.)</i></p>	PPT 7-8	Slides	Overview of modules Common themes
			Trainer packs	Trainer packs for 12a, 12b and 12c
20m	<p><b>TN 5a. Module 12a – content</b></p> <p>Display <b>PPT 9</b>, and briefly run through the content of Module 12a, providing time for participants to view the activities and resources in the packs as you proceed.</p> <p>Afterwards, allow 10 minutes to discuss the content of the module, focusing on the questions on <b>PPT 10</b>.</p> <p>Take brief feedback about which activities they think would be useful for teachers in their organisations, and ways they might adapt them.</p>	PPT 9	Slide	Module 12a: Handling data – overview
(Total 1h 35m)		PPT 10	Slide	Reflections on Module 12a
			Trainer packs	Module 12a (1 per 3-4 participants)
45m	<p><b>TN 5b. Module 12a – sample activity</b></p> <p>Set up the carousel activity using <b>R1-R7</b>.</p> <p>Focus on <b>TN 7 of Module 12a</b> – the carousel of activities. Explain that participants will try out a range of activities around the topic of handling data. For this activity, participants will be <b>in the role of trainees</b>.</p> <p>Lay out the carousel activities on tables, and display <b>PPT 11</b>. Ask participants to work in pairs / small groups and carry out the activities. As they complete the activities, they should reflect on how the activities might be adapted for different vocational areas, and for different levels, and record this on <b>HO 3</b>.</p> <p>Suggest to participants that they try 3-4 of the activities, spending 5-10min on each activity (depending on time available), before moving on.</p>	R 1-R7	Carousel resources	Carousel activities
		PPT 11	Slide	Data handling carousel
		HO 3	Handout	Data handling activities

Time	Content	Resources		
		No.	Style	Title
(Total 2h 20m)	<p>After 30min or so, ask learners to return to their seats, and take brief feedback on the activities, for example:</p> <ul style="list-style-type: none"> <li>• Which activity did you like best? Why?</li> <li>• How might you adapt each activity for your vocational area?</li> <li>• How might you adapt it for different levels?</li> </ul> <p><b>Reflection</b></p> <p>Ask who has experienced a carousel of activities like this before? Invite reflections on the purpose of such an approach in a <b>staff development context</b>. Ask them to think about:</p> <ul style="list-style-type: none"> <li>• What issues might arise?</li> <li>• How could the activity be adapted for different contexts?</li> <li>• How could it be extended?</li> </ul>			
	<b><i>Possible time for lunch break</i></b>			
20m	<p><b>TN 6a. Module 12b – content</b></p> <p>Display <b>PPT 12</b>, and briefly run through the content of Module 12b, providing time for participants to view the activities in the packs as you proceed.</p> <p>Afterwards, allow 10min to discuss the content of the module, focusing on the questions on <b>PPT 13</b>.</p> <p>Take brief feedback about which activities they think would be useful for teachers in their organisations, ways they might adapt them.</p>	<p>PPT 12</p> <p>PPT 13</p>	<p>Slide</p> <p>Slide</p> <p>Trainer packs</p>	<p>Module 12b: Number concepts – overview</p> <p>Reflections on Module 12b</p> <p>Module 12b (1 per 3-4 participants)</p>
25m	<p><b>TN 6b. Module 12b – sample activity</b></p> <p>Focus on <b>TN 5c of Module 12b</b>, and explain that participants will now try another activity – this time aimed at developing understanding of numbers less than 1, i.e. fractions, decimals and percentages, and their equivalence. Again, participants will be <b>in the role of trainees</b> for this activity.</p> <p>Fix a piece of string between two points where all participants can see it. At one</p>		<p>5m length of string</p> <p>Blank pieces of</p>	

Time	Content	Resources		
		No.	Style	Title
(Total 3h 5m)	<p>end of the string pin up a piece of paper showing a zero, at the other a piece of paper showing 1. Ensure there is a pile of small pieces of paper and some paper clips or clothes pegs on each table.</p> <p>Ask each participant to write a number between 0 and 1 on a piece of paper. Invite them to pin their number in the appropriate position on the string.</p> <p>When all numbers have been placed, ask them to review the numbers and decide whether any of them should be moved; encourage them to give reasons for their decision.</p> <p>Challenge participants to add more numbers to fill gaps and to match those already there with alternative representations. Ensure that both decimals and fractions are included.</p> <p><b>Reflection</b> Afterwards, ask participants to work in pairs / small groups and reflect on the following questions (<b>PPT 14</b>):</p> <ul style="list-style-type: none"> <li>• What is the value of this type of concrete activity for concept development? Why?</li> <li>• How might the activity be adapted for other mathematical concepts?</li> <li>• How might you adapt it for different vocational areas?</li> <li>• How could it be extended?</li> </ul>	PPT 14	<p>paper, about A6 size</p> <p>Supply of paper clips, dressmaking pins, or clothes pegs</p> <p>Slide</p>	Reflection on ordering activity
20m  (Total 3h 25m)	<p><b>TN 7a. Module 12c – content</b></p> <p>Display <b>PPT 15</b>, and briefly run through the content of Module 12c, providing time for participants to view the activities in the packs as you proceed.</p> <p>Afterwards, allow 10 mins to discuss the content of the module, focusing on the questions on <b>PPT 16</b>.</p> <p>Take brief feedback about which activities they think would be useful for teachers in their organisations, ways they might adapt them.</p>	<p>PPT 15</p> <p>PPT 16</p>	<p>Slide</p> <p>Slide</p> <p>Trainer packs</p>	<p>Module 12c: Measures shape and space – overview</p> <p>Reflections on Module 12c</p> <p>Module 12c (1 per 3-4</p>

Time	Content	Resources		
		No.	Style	Title
				participants)
25m	<p><b>TN 7b. Module 12c – sample activity</b></p> <p>Focus on <b>TN 6 of Module 12c</b>, and explain that participants will now be writing a vocationally contextualised problem, modelled on a functional skills exam question. Participants will again be <b>in the role of trainees</b> for this activity.</p> <p>Distribute copies of a functional skills exam question where the focus is on measures, shape and space.</p> <p>Ask participants to work through the question noting down any challenges they think their learners will face and how these can be overcome by better preparing their learners. Display <b>PPT 17</b>.</p> <p>Take feedback and pose the question:</p> <ul style="list-style-type: none"> <li>• What steps can you take to better prepare your learners for the summative assessment?</li> </ul> <p>Record feedback on a flipchart and summarise the points made.</p> <p>Now ask participants to work in pairs to write a problem with a similar structure, but contextualised to a different vocational area. Ask each pair to share their question with another pair.</p> <p>Close the session by asking participants to reflect on the advantages and disadvantages of contextualising functional problems to learners' vocational areas.</p>	PPT 17	Slide	
(Total 3h 50m)	<p>Take feedback and discuss a model for 'scaffolding' learners as they develop their functional maths skills (<b>PPT 18</b>).</p>	PPT 18	Slide	Progression factors in functional skills
15m	<p><b>TN 8. Further sources of CPD activity</b></p> <p>In addition to the CPD modules examined in this session, participants should be aware of other CPD modules,</p>			

Time	Content	Resources		
		No.	Style	Title
(Total 4h 5m)	<p>qualifications and wider development opportunities which may be relevant to those teaching and supporting functional mathematics.</p> <p>Return to the issues raised earlier in TN 3, and display the flipchart of the feedback taken. Discuss how well Modules 12a-c address the issues raised. Note those areas which are not covered.</p> <p>Show <b>PPT 19</b> to highlight the range of other CPD opportunities that may help to meet these other needs.</p> <p>As relevant to the audience, explain and discuss each of the following:</p> <ul style="list-style-type: none"> <li>• Development of personal maths skills (<b>PPT 20</b>).</li> <li>• Other LSIS CPD related to functional skills (<b>PPT 21</b>). (Ideally link to the website.) <b>HO 4</b></li> <li>• Diploma courses for numeracy specialists (<b>PPT 22</b>).</li> <li>• Wider professional development (<b>PPT 23</b>), based on Joyce and Showers research, 2002.</li> </ul>	PPT 19	Slide	Further sources of professional development
		PPT 20	Slide	Personal maths skills
		PPT 21	Slide	Other LSIS CPD modules
		HO 4	Handout	Support for English, maths and ESOL: new CPD modules overview
		PPT 22	Slide	A model for transfer
		PPT 23	Slide	Wider professional development
	40m	<p><b>TN 9. Planning CPD programmes</b></p> <p>This final activity requires participants to produce a CPD plan for staff within their own organisation. This could be a single CPD session, or a longer-term CPD plan. Participants may wish to work in pairs or small groups, according to their organisation or setting. Use <b>PPT 24</b> as a prompt.</p> <p>Participants should start by considering</p>	PPT 24	Slide

Time	Content	Resources		
		No.	Style	Title
(Total 4h 45m)	<p>the needs of their staff as identified in the pre-course activity. They should then consider how to adapt the content of Modules 12a, 12b and 12c for their own contexts, and how to follow up and consolidate the module content.</p> <p>They might also consider the wider CPD options which have been touched on, and identify what further content could be included in future CPD sessions that they might run.</p> <p>Trainers should prompt with suggestions of other models of CPD, e.g. peer observation and coaching, action research, networking, etc.</p> <p>At least 30min should be allowed for this activity to provide sufficient time for reflection and planning.</p> <p>Afterwards, ask for 1 or 2 volunteers to share their plans with the group and discuss next steps.</p>			
15m	<p><b>TN 10. Summary and evaluation</b></p> <p>Summarise what has been covered in the session and take outstanding questions. Distribute <b>HO 5</b> with details of useful websites.</p> <p>Return to the session objectives (<b>PPT 25</b>) and discuss whether they have been met.</p> <p>Ask participants to complete evaluation form, if required.</p>	HO 5  PPT 25	Handout  Slide  Evaluation form	Useful websites  Outcomes
(Total 5h 00m)				



## Trainer notes

These notes are to support trainers to facilitate the different activities in the module. They are not meant to be prescriptive, and trainers can adapt the activities as needed to suit the participants. Some activities can be omitted, and others extended, according to the group.

Suggestions for **alternatives**, or for **differentiation** strategies (according to the background and experiences of participants) are given in boxes in the notes for each activity.

PowerPoint slides, resources and handouts can be adapted or omitted as needed. The instructions for most of the activities are given on the PowerPoint slides. Trainers can decide to show the instructions on PowerPoint or to print off the 'instructions' slides and lay copies on tables instead or in addition.

The total running time for the session as it stands is 5 hours. This does not include breaks, although it is recommended that regular breaks are included. However, these times can be changed.

Participants for this module may include:

- Curriculum area managers
- Teacher trainers
- Staff development co-ordinators
- Numeracy / maths teachers
- Mentors

However, in order for the training to be successfully cascaded, it is recommended that all participants have **experience as numeracy / functional mathematics practitioners, and of delivering staff CPD**.

The focus of the module is two-fold, and involves

(a) sampling some of the content of Modules 12a, 12b and 12c with a view to using and adapting them in different CPD contexts; and

(b) participants considering the CPD requirements of staff who support the development of functional mathematics with vocational learners.

In some parts of this module, the participants are put in the role of **trainee teachers** (who work with vocational learners) when experiencing sample CPD activities; this is clearly signalled in the trainer notes. It is important that the module trainer is clear about when participants are experiencing activities as if they were teachers who work with vocational learners, and when participants are taking part in the module as those responsible for staff development (i.e. when participants should have a 'teacher' hat on and when they should have a 'teacher trainer' hat on).

**It is essential that the trainer for this module adapts the activities according to the needs and backgrounds of the participants present.**

### **Suggestions for alternative structures for the module**

- Participants could select which of the sample training activities (activities in TN 5a/b, 6a/b and 7a/b) they wish to focus on, depending on whether their interests lie in collaborative learning (activity in TN 5a/b), conceptual understanding (activity in TN 6a/b), or assessing functional skills (activity in TN 7a/b). Different groups could work on different activities in various parts of the room, and then discuss the teacher training implications of the activity that they have tried. Groups could then present their experiences and reflections back to the whole group.

Note that considerable trainer input is still needed for this approach, and it may work better with two trainers.

- Another role for participants who are more experienced numeracy practitioners is that, rather than joining in some of the sample activities that involve engaging in a numeracy task of some sort, they act as an observer, noting down (for example) interactions between participants, or how the participants find the appropriate support they need to complete the task. These observations can then feed into the following 'reflection' activity. However care must be taken to set up the observer roles in a sensitive and non-judgemental way, particularly if there are other participants who are less confident about their personal maths skills.
- The trainer may decide not to include so many sample activities from Modules 12a, 12b or 12c. Alternatively the trainer may wish to sample and reflect on different activities from the modules, not included in Module 12d.

# TN1

## Trainer notes

Time	Content	Resources		
		No.	Style	Title
20m	<p><b>TN 1. Starter: Modelling a numeracy starter</b></p> <p>Using <b>PPT 2</b>, ask participants to identify the main form of transport they use to travel to work, then group themselves accordingly.</p> <p>Next, ask each participant to display the data on their own mini-whiteboard (or alternative), using whatever representation they see fit. Pairs then compare their representations. Bar charts will mainly be produced – discuss essential aspects of a bar chart, e.g. title, labels, scales, clear messages.</p> <p>Get pairs to write a statement about their findings on modes of transport to work.</p> <p>Ask participants questions about the data to emphasise the purpose of data handling, e.g.</p> <ul style="list-style-type: none"> <li>• Who might want to know this sort of information?</li> <li>• What other information might they want to know?</li> </ul> <p>Emphasise how functional maths is used to solve problems – it is about applying maths to the real world.</p> <p>Ask participants what sorts of data their learners need to collect and analyse and for what purpose.</p> <p>Discuss how to adapt data collection to another context to make it easier or harder.</p> <p><b>Reflection</b> Explain that participants have just completed a starter activity taken from Module 12a. Using <b>PPT 3</b>, ask for their reactions – was this a good starter</p>	PPT 2	Slide	Transport to work
		PPT 3	Slide	Starter activities

Time	Content	Resources		
		No.	Style	Title
(Total 25m)	activity? Why / why not? In pairs / small groups, ask them to discuss: <ul style="list-style-type: none"> <li>• What is the purpose of a starter activity?</li> <li>• What makes an effective starter activity?</li> </ul> Take feedback and highlight key points.			

This is a starter activity, which is used at the beginning of Module 12a. ***Participants should be in the role of trainees for this activity.***

**The purpose of this activity** is for participants to experience a starter activity, and then to reflect on the purpose and effectiveness of starters.

### **Transport to work**

The purpose of this starter activity is to introduce participants to analysing 'real' data in a purposeful way and assess what they know about presenting data. The activity needs to be carried out with a minimum of six participants.

The instructions are on **PPT 2**.

Learners are asked to identify the main form of transport that they normally use to travel to work (only one allowed). They should be asked to move around the room to find out other participants' transport method, and to group themselves according to this form of transport. You should avoid telling them exactly what categories to use, and let them decide these for themselves (e.g. bus, car, bicycle, walk).

**Suggested Question:** *'Which is the most popular method of transport?'* This should encourage participants to count the categories and the number in each category. Participants will need to note the numbers.

Once participants have grouped themselves, they should be asked to work on their own and use their mini-whiteboards to display the data. Allow them to choose whatever representation they consider appropriate.

Ask them to compare their representations with a partner, and discuss any differences and the reasons for their choices. Ask each pair to write a statement about what the data shows about modes of transport. Briefly compare these across the group.

To emphasise the purposeful use of data and make the links with functional mathematics, ask participants supplementary questions about how the data might be used. Suggested questions:

- *Who might want to know this sort of information?*

- *Is this a representative sample? How could it be made more representative?*
- *What other information might they want to know?*
- *How might you obtain more data on modes of transport?* Ensure that both primary (e.g. survey) and secondary (e.g. internet) sources are highlighted here.

Emphasise how functional mathematics is about the application of maths to the real world. It takes key skills a step further by focusing on problem solving.

Ask participants for examples of how their learners might use data to solve vocational problems:

- *What data might they collect and where from?*
- *How might they present and analyse the data?*

### **Reflections**

Explain to participants that they have just experienced the starter activity for Module 12a. Start by asking participants for their general reactions to the activity, and follow this up with supplementary questions, for example:

- Was it a good starter? Why / why not?
- What might have improved it?
- How could it be adapted?

After a brief discussion, show **PPT 3**, and ask participants to work in pairs / small groups to address the two questions:

- What is the purpose of a starter activity?
- What makes an effective starter?

When taking feedback, highlight key issues on the flipchart, and make sure that the following points are raised:

The purpose of starters can be to:

- engage and motivate learners at the beginning of a session when they are at their most receptive;
- use prior knowledge to introduce new ideas and topics; and
- create an atmosphere of participation and involvement.

Effective starters:

- Have a clear purpose
- Contribute to the session's objectives
- Are immediately accessible to everyone

- Involve the whole group
- Are collaborative, interactive and pacy
- Provide challenge
- Have a clear timeframe.

## TN 2

### Trainer notes

Time	Content	Resources		
		No.	Style	Title
10m	<b>TN 2. Introductions</b>			
	Using <b>PPT 4-5</b> , outline the aims and objectives for the day – draw participants' attention to <b>HO 1</b> .	PPT 4-5	Slides	Aims and outcomes
(Total 35m)	Ask participants to introduce themselves, <ul style="list-style-type: none"><li>• Their role, the context in which they work and</li><li>• What they would like to gain from the day</li></ul>	HO 1	Handout	Aims and outcomes

**The purpose of this activity** is to review the aims and intended outcomes of the day and to allow participants to consider whether these meet their requirements.

The aims of the day fall into two categories:

(a) to gain an overview of and insight into Modules 12a, 12b and 12c with a view to adapting and delivering the content in a range of contexts; and

(b) to explore wider issues and training needs relating to staff who teach or support vocational learners with functional mathematics, and to discuss how these needs might be addressed.

Hopefully engaging with (a) will help participants to begin to consider how to address the issues raised in (b).

The sample activities from Modules 12a, 12b and 12c contained within this module aim to address the following issues / training needs in relation to developing numeracy with vocational learners:

- collaborative approaches to learning data handling (TN 5a/5b);
- supporting and developing learners' conceptual understanding (TN 6a/6b); and
- writing 'functional' tasks and questions, which mirror the requirements of functional mathematics assessments (TN 7a/7b).

Trainers do not need to explain all of this to the participants at this stage (otherwise there is a danger of information overload), but it is useful for the trainer to bear in

mind how the day links together, to be clear about the purpose of each activity and to be ready to respond to questions about the structure and purpose of the day.

### **Differentiation**

Trainers should make a note of what the participants wish to gain from the day, and adjust activities (as far as possible) and timings accordingly.

### **Terminology**

In this module, the terms 'numeracy' and 'maths' will be used interchangeably. However numeracy usually refers to the application of maths in practical contexts, whereas maths refers to developing the underpinning skills and knowledge, e.g. how fractions work. The definition of **functional maths** is more akin to that of numeracy

### **Background information: the adult numeracy core curriculum and functional skills**

The content of this pack is linked both to the **adult numeracy core curriculum** and the criteria for **functional mathematics**.

- The adult numeracy core curriculum outlines the skills and competencies required by adults from Entry 1 to Level 2. The interactive tool is available at: <http://www.excellencegateway.org.uk/sflcurriculum>
- Functional skills also address skills from Entry 1 to Level 2. The Ofqual criteria for functional skills can be downloaded from: <http://www2.ofqual.gov.uk/downloads/category/68-functional-skills-subject-criteria>



## TN 3

### Trainer notes

Time	Content	Resources		
		No.	Style	Title
30m	<p><b>TN 3. Issues and training needs</b></p> <p>Refer learners to the pre-course task, using <b>PPT 6</b> as a focus, and draw their attention to <b>HO 2</b> in the Participant pack (as a reminder). Fuller instructions are in TN 3 below.</p> <p>In small groups, ask participants to share and discuss some staff training needs and issues relating to functional mathematics for vocational learners, based on their pre-course task.</p> <ul style="list-style-type: none"> <li>In what ways are these needs different for vocational teachers, numeracy specialists, assessors, etc?</li> </ul> <p>Work in small groups and then take feedback and record on a flipchart. Try to categorise the issues / training needs. Are there any patterns / differences?</p> <p>Highlight those issues that are the dealt with in Modules 12a, 12b and 12c, but also mention other CPD modules that will be summarised later in the session (e.g. relating to teachers' personal maths competence).</p>	PPT 6	Slide	Issues and training needs
(Total 1h 5m)		HO 2	Handout	Staff training needs analysis (pre-course task)

**The purpose of this section** is to allow time for participants to consider aspects of training needs within their own organisations, and how this suite of CPD modules can support CPD.

This activity is in three stages:

The **first stage** provides participants with the opportunity to feed back on the pre-course task, which is an information-gathering exercise about the issues and training needs of staff within their organisations whose role involves developing functional mathematics with vocational learners.

If any participants have not managed to complete the task, encourage them to consider the questions asked and to answer them from their own experience and knowledge relating to their organisations.

Participants should work in small groups to share the results of the pre-course task. The groups need to make notes on the results of their discussions and findings. Trainers should circulate during this part of the activity and note down the types of responses each group is making. This will help to structure the whole-group feedback from the activity. The trainer may also prompt some groups with questions, e.g. about comparisons between organisations or between different roles.

The **second stage** is the whole-group feedback. The trainer needs to decide what is the most appropriate way to feed back, depending on the responses of the individual groups. For example, each group could present their results on flipcharts, or key headings could be placed on flipchart sheets around the room - such as *needs of staff, issues observed in teaching and learning, needs of management, needs of learners*, etc) and groups could write their responses on these.

The trainer then needs to summarise the results and pull out some key points, inviting comments from the group as a whole. Other possible questions to ask include:

- What are your organisations already doing to support the delivery of functional mathematics?
- What do participants think can or should be done to address some of these needs?
- Can they all be addressed through staff training / CPD alone or is something else / more needed?

Finally, in the **third stage**, the activity can be drawn together by the trainer explaining how the rest of the day will unfold, and how the sample activities from Modules 12a, 12b and 12c are attempting to address some of the issues experienced by those developing numeracy with vocational learners. Explain that other CPD modules will also be referred to later in the session which might address other issues – e.g. the personal maths skills of teachers (Module 7) or other aspects of functional skills. You may want to take this opportunity to signpost participants to the LSIS CPD modules on the Excellence Gateway:

<http://www.excellencegateway.org.uk/node/21207>

The suggested timing for this activity is 10-15 minutes on each of the first two stages, and 5 minutes on the last stage. However, trainers should ensure that sufficient time is provided for participants' needs.

Following this activity, trainers may want to make adjustments to the timings and content of the remainder of the session to ensure that the needs and issues raised by participants are met as far as is possible.

## TN 4

### Trainer notes

Time	Content	Resources		
		No.	Style	Title
10m	<p><b>TN 4. Overview of the modules</b></p> <p>Ask if anyone has attended or delivered any of Modules 12a-c.</p> <p>Talk through <b>PPT 7-8</b>. Respond to any questions that arise.</p>	PPT 7-8	Slides	Overview of modules Common themes
(Total 1h 15m)	Refer to trainer packs for Module 12a, 12b and 12c available – 1 copy per 3-4 participants. <i>(Personal copies should have been sent electronically in advance.)</i>		Trainer packs	Trainer packs for 12a, 12b and 12c

**The purpose of this section** is to give participants a brief overview of the content of Modules 12a, 12b and 12c.

Start by asking if anyone has either delivered or participated in Modules 12a-c. If they have, ask for brief details and their reflections on the training.

Show **PPT 7**, and explain that each module has a dual focus: firstly, a curriculum focus (based on the three strands of the adult numeracy core curriculum), and an additional focus:

- **Module 12a** focuses on functional mathematics, with an emphasis on process skills and problem solving.
- **Module 12b** focuses on developing conceptual understanding, and addressing misconceptions.
- **Module 12c** focuses on the demands of summative assessment for functional skills.

Show **PPT 8** to highlight key themes running through the modules:

- the numeracy curriculum and its relevance to different vocational areas;
- functional skills and the application of maths to solve problems; and
- active and collaborative approaches to learning maths.

Explain that part of the aim for today is to consider how to adapt some of the content from these modules for participants' own organisational contexts.

Explain that the training modules are aimed primarily at the needs of vocational teachers, but many numeracy specialists may also find them useful, especially those who are new to teaching, and any who have not yet completed a Level 5 diploma in teaching mathematics / numeracy.

## TN 5a

### Trainer notes

Time	Content	Resources		
		No.	Style	Title
20m	<p><b>TN 5a. Module 12a – content</b></p> <p>Display <b>PPT 9</b>, and briefly run through the content of Module 12a, providing time for participants to view the activities and resources in the packs as you proceed.</p> <p>Afterwards, allow 10 minutes to discuss the content of the module, focusing on the questions on <b>PPT 10</b>.</p>	PPT 9	Slide	Module 12a: Handling data – overview
(Total 1h 35m)	<p>Take brief feedback about which activities they think would be useful for teachers in their organisations, and ways they might adapt them.</p>	PPT 10	Slide	Reflections on Module 12a
			Trainer packs	Module 12a (1 per 3-4 participants)

This section is in two parts, and focuses on the content and activities of Module 12a: Handling data. **The purpose of the activity** is to introduce participants to the module, explain the structure, and allow participants to consider organisational priorities.

The trainer should provide a brief run-through of the content of Module 12a, using **PPT 9**. Participants should have copies of the training pack for Module 12a available to consult as they go through – it is recommended that at least one copy is available for every 3-4 participants.

Trainers might wish to highlight the following points:

- **Starter: transport to work:** each of the modules begins with a starter activity – participants experienced this one at the start of this module. Starters can be amended to suit the context.
- **Functional mathematics: process skills:** this introduces the process skills of functional maths with an example from a vocational context. Participants are then encouraged to identify the process skills within the starter activity.
- **Challenge of functional skills:** participants are introduced to a functional maths exam paper to see how it differs to a ‘traditional’ maths / numeracy exam. They are encouraged to identify the challenges presented to learners.

- **Data handling in vocational areas:** at this point the module shifts from a general focus on functional skills to a specific focus on data handling. Participants are introduced to the adult numeracy core curriculum, and asked to focus on the data handling strand, identifying which skills are required within their vocational area.
- **Creating a story:** this is the first of a series of activities that exemplify active and collaborative approaches to data handling. Participants are shown a bar chart without any title or labels, and are asked to reason what the chart shows as progressively more information is shown. They are then required to compose challenging questions that could be asked relating to the graph.
- **Carousel of activities:** participants have the opportunity to experience a range of other active approaches to data handling, and reflect on their value and how they might be adapted to vocational contexts.
- **Planning a data handling activity:** participants plan a purposeful data handling activity that is relevant to the needs of their vocational learners.

It should be emphasised that there is a lot of content to fit in a half-day session, and that participants might want to prioritise which sections are included, according to the context and experience of the group. For example, if participants are already familiar with the functional maths process skills, this section can be omitted.

Allow time for participants to discuss the content of the module in pairs / small groups, focusing on the questions on **PPT 10**:

- Which sections and activities would be most useful to teachers in your organisation?
- Are there any that you wouldn't use?
- How might you adapt the materials for your organisation?

Take brief feedback.

## TN 5b

### Trainer notes

Time	Content	Resources		
		No.	Style	Title
45m	<p><b>TN 5b. Module 12a – sample activity</b></p> <p>Set up the carousel activity using <b>R1-R7</b>.</p> <p>Focus on <b>TN 7 of Module 12a</b> – the carousel of activities. Explain that participants will try out a range of activities around the topic of handling data. For this activity, participants will be <b>in the role of trainees</b>.</p> <p>Lay out the carousel activities on tables, and display <b>PPT 11</b>. Ask participants to work in pairs / small groups and carry out the activities. As they complete the activities, they should reflect on how the activities might be adapted for different vocational areas, and for different levels, and record this on <b>HO 3</b>.</p> <p>Suggest to participants that they try 3-4 of the activities, spending 5-10min on each activity (depending on time available), before moving on.</p> <p>After 30min or so, ask learners to return to their seats, and take brief feedback on the activities, for example:</p> <ul style="list-style-type: none"> <li>• Which activity did you like best? Why?</li> <li>• How might you adapt each activity for your vocational area?</li> <li>• How might you adapt it for different levels?</li> </ul> <p><b>Reflection</b></p> <p>Ask who has experienced a carousel of activities like this before? Invite reflections on the purpose of such an approach in a <b>staff development context</b>. Ask them to think about:</p> <ul style="list-style-type: none"> <li>• What issues might arise?</li> <li>• How could the activity be adapted for different contexts?</li> <li>• How could it be extended?</li> </ul>	R 1-R7	Carousel resources	Carousel activities
		PPT 11	Slide	Data handling carousel
		HO 3	Handout	Data handling activities
(Total 2h 20m)				

NB This session relates to **TN 7. Carousel of activities** in **Module 12a**.

**The purpose of this activity** is to allow participants to reflect on the purpose and uses of a carousel activity, both in teacher training and with learners.

For this activity, participants should be told that they are **in the role of trainees who may attend Module 12a**.

There are seven data handling activities to choose from – trainers may want to limit the selection to 4 or 5 to accommodate time constraints. The trainer lays out the selected carousel activities on tables. Ensure there is plenty of space around each activity. **PPT 11** provides instructions.

Participants must work in pairs or small groups, not on their own. They carry out the tasks discussing their answers. Draw participants' attention to **HO 3** for them to note down how they might adapt the activity for their vocational area, and also for different levels of learner.

Data handling carousel of activities:

- R 1: Sampling
- R 2: An average exercise
- R 3: Using averages
- R 4: Which is better?
- R 5: Labels
- R 6: True or false?
- R 7: Clues

The resources for the data handling carousel are taken from *Learning mathematics in context*: <http://tlp.excellencegateway.org.uk/tlp/xcurricula/lmic/sessions/index.html>  
(NB Point out that all materials in the carousel can be downloaded from this page)

One activity to be set out per table, with tables in cabaret style around the room (if you are short of space, activities can be placed face-down in the centre of each table until required). Participants move from one table to another to try out the activities, and use **HO 3** to record comments. Trainers may want to allow participants to decide when to move on, or alternatively ask them change activity every 5-7 mins. Allow a maximum of 30 min for the carousel.

Trainers should provide support with activities where requested, and ask questions to provoke small group discussion.

### **Feedback and reflection**

First of all, take feedback on the carousel activities. For example:

- Which activities did you particularly like? Why?
- What are the advantages of collaborative small group work?



- What did you learn from discussions with your peers?
- How could you adapt the activities to make them suitable for your vocational learners?
- How could they be adapted for different levels?

Highlight that there is a handout in each module with links to a selection of useful websites as a source of further activities and materials. This is included as **HO 5** in Module 12d.

Next, ask who has participated in such carousel activities before, and invite more general reflections on the **purpose of carousel activities**. The following points should be highlighted:

- They facilitate small group working.
- They encourage collaboration and discussion.
- They provide a quick way of sampling a range of resources.
- They encourage learners to move around the room, and add variety to the session.

Go on to discuss issues that might arise in a carousel activity, and ask participants:

- Is it better to allow people to choose which resources to look at, or insist that they move on every 5-10 mins?
- How could the activity be adapted for different contexts?
- How could it be extended?

If time allows, discuss the use of a carousel of activities as a means of **assessing learners**, and contrast with conventional approach of working individually on paper-based assessments. Discuss what else a carousel might bring to the assessment.

## TN 6a

### Trainer notes

Time	Content	Resources		
		No.	Style	Title
20m          (Total 2h 40m)	<b>TN 6a. Module 12b – content</b>  Display <b>PPT 12</b> , and briefly run through the content of Module 12b, providing time for participants to view the activities in the packs as you proceed.  Afterwards, allow 10min to discuss the content of the module, focusing on the questions on <b>PPT 13</b> .  Take brief feedback about which activities they think would be useful for teachers in their organisations, ways they might adapt them.	PPT 12     PPT 13	Slide    Slide   Trainer packs	Module 12b: Number concepts – overview  Reflections on Module 12b  Module 12b (1 per 3-4 participants)

This section follows a similar pattern to TN 5a, and focuses on the content and activities of Module 12b: Number concepts. **The purpose of the activity** is to introduce participants to the module, explain the structure, and allow participants to consider organisational priorities.

The trainer should provide a brief run-through of the content of Module 12b, using **PPT 12**. Participants should have copies of the training pack for Module 12b available to consult as they go through – it is recommended that at least one copy is available for every 3-4 participants.

Trainers might wish to highlight the following points:

- **Starter: equivalence cards:** a card-matching activity, focusing on equivalences between fractions, decimals and proportion.
- **Functional maths in vocational contexts:** participants are introduced to the number strand of the numeracy curriculum, and are encouraged to make links with their vocational area.
- **Calculating skills related to whole number:** this activity is designed to highlight a variety of different methods of calculation – both standard / written and non-standard / mental. Trainers should focus on how some methods are learned by rote, with little understanding, while other demand a good 'feel' for the number system.

- **Developing conceptual understanding:** participants explore a series of four varied activities (5a-d) to promote conceptual understanding of number. Activities 5a-c are designed to develop a 'feel' for numbers and an understanding of place value, rather than learning rules and rote methods. As such, they promote a more active and connected view of maths, rather than a traditional 'transmission' approach. Activity 5d focuses more on functional application of maths – and the idea that there are rarely simple right and wrong answers in the real world – just informed decisions to make!
- **Exploration of common errors:** participants analyse a range of common learner errors, and the misconceptions that often lie beneath them. Ways of overcoming the misconception and moving learners on are discussed, based around conceptual understanding.
- **Proportional reasoning:** this activity examines common difficulties with ratio and proportion experienced by vocational learners. It highlights the general structure of such problems, and how substituting 'simple' numbers can help identify the correct operation to use.

Again, it should be emphasised that there is a lot of content to fit in a half-day session, and that participants might want to prioritise which sections are included, according to the context and experience of the group. For example, groups who have already attended Module 12a will not need to be introduced to the numeracy core curriculum again (TN 3 of Module 12b). Trainers may also wish to customise the activities that are used.

Allow time for participants to discuss the content of the module in pairs / small groups, focusing on the questions on **PPT 13**:

- Which sections and activities would be most useful to teachers in your organisation?
- Are there any that you wouldn't use?
- How might you adapt the materials for your organisation?

Take brief feedback.

## TN 6b

### Trainer notes

Time	Content	Resources		
		No.	Style	Title
25m	<p><b>TN 6b. Module 12b – sample activity</b></p> <p>Focus on <b>TN 5c of Module 12b</b>, and explain that participants will now try another activity – this time aimed at developing understanding of numbers less than 1, i.e. fractions, decimals and percentages, and their equivalence. Again, participants will be <b>in the role of trainees</b> for this activity.</p> <p>Fix a piece of string between two points where all participants can see it. At one end of the string pin up a piece of paper showing a zero, at the other a piece of paper showing 1. Ensure there is a pile of small pieces of paper and some paper clips or clothes pegs on each table.</p> <p>Ask each participant to write a number between 0 and 1 on a piece of paper. Invite them to pin their number in the appropriate position on the string.</p> <p>When all numbers have been placed, ask them to review the numbers and decide whether any of them should be moved; encourage them to give reasons for their decision.</p> <p>Challenge participants to add more numbers to fill gaps and to match those already there with alternative representations. Ensure that both decimals and fractions are included.</p> <p><b>Reflection</b> Afterwards, ask participants to work in pairs / small groups and reflect on the following questions (<b>PPT 14</b>):</p> <ul style="list-style-type: none"> <li>• What is the value of this type of concrete activity for concept development? Why?</li> <li>• How might the activity be adapted for other mathematical concepts?</li> </ul>		<p>5m length of string</p> <p>Blank pieces of paper, about A6 size</p> <p>Supply of paper clips, dressmaking pins, or clothes pegs</p>	
(Total		PPT 14	Slide	Reflection on ordering activity

Time	Content	Resources		
		No.	Style	Title
3h 5 m)	<ul style="list-style-type: none"> <li>How might you adapt it for different vocational areas?</li> <li>How could it be extended?</li> </ul>			

NB This relates to the activity in **TN 5c. Ordering and equivalence** in **Module 12b**.

For this activity, participants should be told that they are **in the role of trainees** who may attend Module 12b.

**The purpose of this activity** is to enable participants to develop a deeper understanding of the ordering and forms of representation of fractional numbers. It is an example of an activity which helps to develop a ‘feel’ for number. It is intended to encourage participants / teachers to be imaginative about how they support the development of functional maths and the understanding of number-related concepts with their learners.

**Follow the instructions above for the activity.**

### Focus for discussion

Discuss the nature of fractions as numbers in their own right. Explore decimal notation as representations of tenths and hundredths. Use calculators to input fractions as one number divided by another and comment on the resulting decimal. Once participants have pinned up their fraction numbers it is likely that repositioning of the numbers will be required to get some semblance of accuracy in terms of the scale being used. Encourage participants to view this as a problem solving task in itself. How would they manage this with a group of learners?

Focus on simple fractions that participants are likely to encounter in everyday life and work. Ask for examples of where participants encounter fractions and decimals in their vocational context. This is an opportunity to show their relevance to, for example: measuring - time, weight, length; calculating - money, time; interpreting data in charts and graphs.

### Differentiation

It may be necessary to encourage participants to extend their decimal fractions beyond one decimal place or common fraction equivalents.

Challenge more confident participants to come up with very small decimals and consider their position on the scale.

Continue funneling down to explore hundredths.

### Feedback and reflection

Encourage reflection on the activity by displaying the questions on **PPT 14**:

- What is the value of this type of concrete activity for concept development? Why?
- How might the activity be adapted for other mathematical concepts?
- How might you adapt it for your vocational area?

Other mathematical concepts that can be explored in a similar way include:

- Order and compare whole numbers
- Order and compare common measures
- Rounding
- Probability
- Averages – mean, median and mode and range
- Scale

Possible vocational applications:

- pH scale
- Screw dimensions
- Heights of horses
- Any of the mathematical concepts mentioned above applied in a practical setting

## TN 7a

### Trainer notes

Time	Content	Resources		
		No.	Style	Title
20m  (Total 3h 25m)	<b>TN 7a. Module 12c – content</b>  Display <b>PPT 15</b> , and briefly run through the content of Module 12c, providing time for participants to view the activities in the packs as you proceed.  Afterwards, allow 10 mins to discuss the content of the module, focusing on the questions on <b>PPT 16</b> .  Take brief feedback about which activities they think would be useful for teachers in their organisations, ways they might adapt them.	PPT 15  PPT 16	Slide  Slide  Trainer packs	Module 12c: Measures shape and space – overview  Reflections on Module 12c  Module 12c (1 per 3-4 participants)

This section follows a similar pattern to TN 5a and TN 6a, and focuses on the content and activities of Module 12c: Common measures, shape and space.

**The purpose of the activity** is to introduce participants to the module, explain the structure, and allow participants to consider organisational priorities.

The trainer should provide a brief run-through of the content of Module 12c, using **PPT 15**. Participants should have copies of the training pack for Module 12c available to consult as they go through – it is recommended that at least one copy is available for every 3-4 participants.

Trainers might wish to highlight the following points:

- **Starter: Matching domino game:** a domino games matching common measures. It raises issues such as multiplying and dividing by 10, 100, 1000; hours and minutes as decimals; and zero as a place holder.
- **Identify the measures, shape and space curriculum:** this introduces the MSS strand of the numeracy curriculum, and encourages participants to make links with their vocational subjects.
- **Examiners’ report and common errors:** common mistakes in MSS identified by functional mathematics examiners are highlighted and discussed. Participants are then involved in an activity, where they look at a selection of errors and identify what mistake the learner has made.

- **Activities for teaching measures, shape and space:** participants experience a variety of activities specifically related to area, perimeter and volume. The activities highlight the relationship between the terms and address common errors and misconceptions.
- **Links to summative assessment:** participants review a question with an MSS focus from a functional mathematics exam paper, noting down aspects they think their learners might find challenging. They then focus on the implications for teaching. Next, they work in vocational groups (where possible) to devise functional maths problems that mirror the exam questions. Finally, participants discuss issues around embedding and contextualising functional maths within vocational areas, and the implications for summative assessment.

Once again, it should be emphasised that there is a lot of content to fit in a half-day session, and that participants might want to prioritise which sections are included, according to the context and experience of the group. Trainers may also wish to customise the activities that are used.

Allow time for participants to discuss the content of the module in pairs / small groups, focusing on the questions on **PPT 16**:

- Which sections and activities would be most useful to teachers in your organisation?
- Are there any that you wouldn't use?
- How might you adapt the materials for your organisation?

Take brief feedback.



## TN 7b

### Trainer notes

Time	Content	Resources		
		No.	Style	Title
25m	<p><b>TN 7b. Module 12c – sample activity</b></p> <p>Focus on <b>TN 6 of Module 12c</b>, and explain that participants will now be writing a vocationally contextualised problem, modelled on a functional skills exam question. Participants will again be <b>in the role of trainees</b> for this activity.</p> <p>Distribute copies of a functional skills exam question where the focus is on measures, shape and space.</p> <p>Ask participants to work through the question noting down any challenges they think their learners will face and how these can be overcome by better preparing their learners. Display <b>PPT 17</b>.</p> <p>Take feedback and pose the question:</p> <ul style="list-style-type: none"> <li>• What steps can you take to better prepare your learners for the summative assessment?</li> </ul> <p>Record feedback on a flipchart and summarise the points made.</p> <p>Now ask participants to work in pairs to write a problem with a similar structure, but contextualised to a different vocational area. Ask each pair to share their question with another pair.</p> <p>Close the session by asking participants to reflect on the advantages and disadvantages of contextualising functional problems to learners' vocational areas.</p>	PPT 17	Slide	Sample functional skills exam question
(Total 3h 50m)	<p>Take feedback and discuss a model for 'scaffolding' learners as they develop their functional maths skills (<b>PPT 18</b>).</p>	PPT 18	Slide	Progression factors in functional skills

NB This relates to an abridged version of TN 6 in Module 12c.

For this activity, participants should be told that they are **in the role of trainees who may attend Module 12c**.

The purpose of this activity is to allow participants to review an example question taken from a Level 1/2 functional skills paper. They then use the question as a basis for preparing a question of their own which is related to their vocational area.

Participants are asked to bring with them an example exam paper used by their organisation. They will need to identify those questions which focus on measures, shape and space. It is advisable that the trainer has some examples ready in case participants fail to bring any with them. Example questions can be taken from past papers. The one chosen here can be replaced with an alternative that the trainer considers reasonable. Select questions where there is a focus on measures, shape and space.

OCR Level 2 Functional Maths April 2011 Question 3 - downloadable from:

[http://pdf.ocr.org.uk/download/pp\\_11/ocr\\_62770\\_pp\\_11\\_fs\\_qp\\_april.pdf](http://pdf.ocr.org.uk/download/pp_11/ocr_62770_pp_11_fs_qp_april.pdf)

The accompanying data sheet can be downloaded from:

[http://pdf.ocr.org.uk/download/pp\\_11/ocr\\_62771\\_pp\\_11\\_fs\\_qp\\_april\\_rb.pdf](http://pdf.ocr.org.uk/download/pp_11/ocr_62771_pp_11_fs_qp_april_rb.pdf)

Distribute the example question and ask participants to work through the question noting down anything they think learners will find challenging or any implications the question has for their teaching. Display **PPT 17**.

### **Differentiation**

Some participants may find the selected question challenging. The trainer should be ready to give support as required.

Alternatively more confident participants can be teamed with those who are less confident.

Take feedback from the groups on both points. Focus on the implications for teaching.

Pose the question:

- What steps can you take to better prepare your learners for the summative assessment?

Record the ideas on a flipchart for all to see. Summarise the suggestions and make any necessary additions.

Organise participants into small vocational groups (where possible) and ask them to write a question or problem of their own which could be used with their vocational learners. Allow no more than 10min for this.

Point out that this is an abridged version of the activity in Module 12c, and more time should be allowed when delivering the module.

### **Feedback and reflection**

Firstly allow each group to briefly outline their question and invite other groups to comment, but keep this part short.

Remind participants that functional mathematics summative assessments aren't contextualised to any one vocational area. Display **PPT 18**, and ask participants to discuss the following question in pairs / small groups:

- What are the advantages and disadvantages of contextualising problems to learners' vocational areas?
- How would you help learners to transfer their maths skills from familiar to less familiar situations and contexts, in preparation for an exam?

Allow 5 mins for discussion, then take feedback.

Remind participants that what is familiarity in one vocational area can be unfamiliar in another, so interaction with colleagues and sharing of resources is good practice – and saves time!

Flag up additional resources, for example:

'Writing your own contextualised activities' from *LSIS Teaching and Learning Functional Mathematics* (pp.59-78):-

<http://archive.excellencegateway.org.uk/page.aspx?o=201311>

OCR support materials – tasks to use as teaching resources or practice assignments: *SMP problem solving tasks for Functional Skills Maths* (see 'Support materials'):

Level 1: <http://www.ocr.org.uk/qualifications/functional-skills-maths-level-1-09865>

Level 2: <http://www.ocr.org.uk/qualifications/functional-skills-maths-level-2-09866>

## TN 8

### Trainer notes

Time	Content	Resources		
		No.	Style	Title
15m	<p><b>TN 8. Further sources of CPD activity</b></p> <p>In addition to the CPD modules examined in this session, participants should be aware of other CPD modules, qualifications and wider development opportunities which may be relevant to those teaching and supporting functional mathematics.</p> <p>Return to the issues raised earlier in TN 3, and display the flipchart of the feedback taken. Discuss how well Modules 12a-c address the issues raised. Note those areas which are not covered.</p> <p>Show <b>PPT 19</b> to highlight the range of other CPD opportunities that may help to meet these other needs.</p> <p>As relevant to the audience, explain and discuss each of the following:</p> <ul style="list-style-type: none"> <li>• Development of personal maths skills (<b>PPT 20</b>).</li> <li>• Other LSIS CPD related to functional skills (<b>PPT 21</b>). (Ideally link to the website.) <b>HO 4</b></li> <li>• Diploma courses for numeracy specialists (<b>PPT 22</b>).</li> <li>• Wider professional development (<b>PPT 23</b>), based on Joyce and Showers research, 2002.</li> </ul>			
<i>(Total 4h 5m)</i>		PPT 19	Slide	Further sources of professional development
		PPT 20	Slide	Personal maths skills
		PPT 21	Slide	Other LSIS CPD modules
		HO 4	Handout	Support for English, maths and ESOL: new CPD modules overview
		PPT 22	Slide	A model for transfer
		PPT 23	Slide	Wider professional development

**The purpose of this section** is to raise participants' awareness of other CPD resources and qualifications that may be relevant to those teaching functional mathematics to vocational learners. This includes (**PPT 19**):

- CPD and qualifications to develop teachers' personal maths skills;
- other LSIS CPD modules related to functional skills delivery;
- diploma courses for maths / numeracy subject specialists; and
- other forms of professional development, including coaching and mentoring, and peer observation.

This section can be adapted according to the needs and experience of the group, but the following are useful to highlight.

### **Personal maths skills**

Many vocational teachers may need to develop their personal maths skills in order to become effective in teaching and supporting functional maths.

Suggest that anyone supporting or teaching functional maths should have at least a Level 2 qualification in maths themselves. This could mean either GCSE or functional mathematics; briefly discuss the two qualifications, highlighting the fact that GCSE will include technical maths at a higher level, but functional maths may be more relevant to their delivery. Emphasise that these are quite different qualifications – and that one isn't necessarily harder than the other.

Use **PPT 20** to introduce the Level 3 Award in Mathematics for Numeracy Teaching. <http://repository.excellencegateway.org.uk/fedora/objects/import-pdf:108/datastreams/PDF/content> Highlight that this is a 'functional skills' style qualification, rather than high level technical maths (such as an A-level). It was originally introduced to prepare numeracy teachers for specialist diploma courses, but may be useful for anyone who would like to be qualified at a level above their learners. Mention that LSIS has developed a blended learning programme to support the qualification – Module 7: Developing the personal maths skills of teachers and assessors <http://www.excellencegateway.org.uk/node/24995>

### **Other LSIS CPD**

Display **PPT 21** and provide copies of the handout **HO 4: Support for English, maths and ESOL: New Continuing Professional Development Modules overview**, downloaded from <http://www.excellencegateway.org.uk/node/21277> Briefly discuss the various CPD modules available, and which may be relevant to participants' organisations. Note that the slide is hyperlinked to a webpage with details of the modules: <http://www.excellencegateway.org.uk/node/21207>. Ideally you would demonstrate this link.

Participants may wish to explore the content of individual modules further, if time permits.

### **Specialist diploma courses**

It is recommended that anyone who is leading (as opposed to supporting) functional mathematics should undertake a Level 5 Diploma in Teaching Mathematics: Numeracy (**PPT 22**). Ask if anyone already holds this qualification, and discuss which organisations offer the qualification within the region. Mention that it is possible for new teachers to integrate this qualification with a DTLLS course to avoid taking two separate qualifications.

### **Wider professional development**

Finally, highlight that there are limits to what can be achieved simply by undertaking CPD and qualifications. **PPT 23** summarises a model for transferring good practice within an organisation, based on research by Joyce and Showers (Student achievement through staff development, 2002). The research found that providing training alone had no measurable impact on classroom practice – what really made the difference is teachers receiving coaching, mentoring and feedback on their teaching and coaching. Point out that this doesn't have to be from managers, but that peer observation and peer mentoring can also be very effective methods of professional development. Briefly discuss if this happens in participants' organisations.

## TN 9

### Trainer notes

Time	Content	Resources		
		No.	Style	Title
40m	<p><b>TN 9. Planning CPD programmes</b></p> <p>This final activity requires participants to produce a CPD plan for staff within their own organisation. This could be a single CPD session, or a longer-term CPD plan. Participants may wish to work in pairs or small groups, according to their organisation or setting. Use <b>PPT 24</b> as a prompt.</p> <p>Participants should start by considering the needs of their staff as identified in the pre-course activity. They should then consider how to adapt the content of Modules 12a, 12b and 12c for their own contexts, and how to follow up and consolidate the module content.</p> <p>They might also consider the wider CPD options which have been touched on, and identify what further content could be included in future CPD sessions that they might run.</p> <p>Trainers should prompt with suggestions of other models of CPD, e.g. peer observation and coaching, action research, networking, etc.</p> <p>At least 30min should be allowed for this activity to provide sufficient time for reflection and planning.</p>	PPT 24	Slide	Planning CPD
(Total 4h 45m)	<p>Afterwards, ask for 1 or 2 volunteers to share their plans with the group and discuss next steps.</p>			

**The purpose of this activity** is to give participants the opportunity to begin a plan for CPD for their own organisation.

Participants need to come up with a programme of CPD for their organisation in relation to supporting the needs of staff whose role involves developing the functional mathematics of vocational learners.

It may make sense to group participants together either from the same or similar types of organisation.

Trainers should prompt participants with suggestions, for example:

- mixing and matching content from the three modules to meet needs specific to the organisation (How might this be done?);
- complementing the existing materials with other content (What might this be?);
- identifying and improving the personal maths skills of staff (How might this happen? Would it involve a qualification?);
- researching staff and organisational needs further (e.g. training needs analyses, interviewing learners about their experiences, exploring strategies used by other institutions); or
- using other forms of professional development (e.g. coaching and mentoring, peer observation, networking, action research, etc).

Participants might also want to consider the format of the delivery, for example:

- one-off training day (plus follow-up?)
- a training programme (e.g. 2 hours per week for 6 weeks)
- blended learning, with tasks to complete between sessions
- offering or developing certificated programmes.

Remember to allow sufficient time for participants to carry out feedback about what they have worked on in this activity, and where they are headed next in terms of planning CPD for their staff.

Participants may also wish to exchange contact details and set up their own informal support network with respect to meeting the CPD needs of staff who develop the numeracy / maths skills of vocational learners.



## TN 10

### Trainer notes

Time	Content	Resources		
		No.	Style	Title
15m	<b>TN 10. Summary and evaluation</b>  Summarise what has been covered in the session and take outstanding questions. Distribute <b>HO 5</b> with details of useful websites.	HO 5	Handout	Useful websites
(Total 5h 00m)	Return to the session objectives ( <b>PPT 25</b> ) and discuss whether they have been met.	PPT 25	Slide	Outcomes
	Ask participants to complete evaluation form, if required.		Evaluation form	

Summarise what has been covered in the session and take any outstanding questions. Distribute **HO 5** with details of useful websites.

Return to the session objectives (**PPT 25**) and discuss whether they have been met.

Ask participants to complete an evaluation form, if required.

### Module 12d

Handouts are included here for your information. They are all included in the Participant pack (apart from HO 4 – see below), as well as PowerPoint slide notes.

### Resources

The resources for the data handling carousel in TN 5b are taken from *Learning mathematics in context*:

<http://tlp.excellencegateway.org.uk/tlp/xcurricula/lmic/sessions/index.html>

Prepare and lay out the carousel activities on tables and display PPT 11 with instructions.

### Resources (for carousel)

R 1: Sampling. *Cut out the cards (Ease / Bias / Other) and have coloured pens or sticky spots (in red, yellow and green) for participants to rate each card.*

R 2: An average exercise

R 3: Using averages

R 4: Which is better?

R 5: Labels. *Please note that the diagram with the title 'Digital technology' has had the labels obscured. It may be that these labels become visible when you open the file. If this is the case, make sure the labels in the diagram are fully obscured before printing the resource. Cut out the labels on the sheet for participants to use in the exercise.*

R 6: True or false?

R 7: Clues

## **Handouts**

HO 1: Aims and outcomes

HO 2: Staff training needs analysis (pre-course task)

HO 3: Data handling activities

HO 4: Support for English, maths and ESOL – new CPD modules overview (*pdf needs to be downloaded*)

HO 5: Useful websites

## R1: Sampling

Two learners are planning a survey among their fellow learners to find out what sort of things people have for breakfast and whether they eat breakfast in the canteen.

They are feeling ambitious and want to ask 100 learners.

They are discussing where they should find their sample of 100 learners. They come up with the possibilities listed on the accompanying sheets.

Discuss each method proposed, and rate it on a traffic light system, using **red** (bad), **yellow** (OK) or **green** (good) marks.

The ratings should be for:

- Ease of collection
- Lack of bias
- Other issues – any other negative or positive that you come up with

<p>Stand at the main entrance at 08:30 on Monday and ask the first 100 learners who come through the door.</p>	<p><b>Ease</b></p>	<p><b>Bias</b></p>	<p><b>Other</b></p>
<p>Ask all the other learners in your group and in nearby rooms during one of your sessions.</p>	<p><b>Ease</b></p>	<p><b>Bias</b></p>	<p><b>Other</b></p>
<p>Stand at the entrance at 08:30 each day for a week and ask the first 20 learners you see each day.</p>	<p><b>Ease</b></p>	<p><b>Bias</b></p>	<p><b>Other</b></p>
<p>Give every learner in the organisation a number. Choose 100 numbers at random from a hat and ask those learners to answer the questionnaire.</p>	<p><b>Ease</b></p>	<p><b>Bias</b></p>	<p><b>Other</b></p>
<p>Go into 20 classrooms of different subjects during the morning and ask five learners in each classroom.</p>	<p><b>Ease</b></p>	<p><b>Bias</b></p>	<p><b>Other</b></p>
<p>Go round during the day asking learners to complete the questionnaire, but first ask learners where they live to make sure that different distances are represented.</p>	<p><b>Ease</b></p>	<p><b>Bias</b></p>	<p><b>Other</b></p>

Email a questionnaire to every learner in the organisation.	<b>Ease</b>	<b>Bias</b>	<b>Other</b>
Go to the canteen at lunchtime and ask 50 male and 50 female learners.	<b>Ease</b>	<b>Bias</b>	<b>Other</b>
Stand at the entrance at five different times during the day and ask 10 female and 10 male learners each time.	<b>Ease</b>	<b>Bias</b>	<b>Other</b>
Wander around the organisation at break time and ask the first 50 female and the first 50 male learners you meet.	<b>Ease</b>	<b>Bias</b>	<b>Other</b>
Go around during the day asking learners to complete the questionnaire, but ask them which course they are doing to make sure that every type of course is represented.	<b>Ease</b>	<b>Bias</b>	<b>Other</b>
Go to the canteen at 08:30 each day and ask 20 learners.	<b>Ease</b>	<b>Bias</b>	<b>Other</b>

## R 2: An average exercise

Look at the exercise on averages below, which has been completed by a learner.

Go through it and correct all the errors made.

Write comments against each error that would help the learner who completed it to understand the mistakes they have made.

1. Find the median of the set of numbers: 2, 5, 7, 8, 9, 12  
Answer: There are 6 numbers so the median is the third which is 7
2. Find the median of the set of numbers: 4, 7, 8, 8, 9, 12  
Answer: Median is 8.5
3. Find the median of the set of numbers: 3, 6, 12, 15, 11, 21, 15, 16, 22  
Answer: Median is 11
4. Find the mean of the set of numbers: 3, 11, 12  
Answer: Mean is 11
5. Find the mean of the set of numbers: 0, 0, 0, 1, 2, 2, 3, 3, 5, 5  
Answer: Mean is  $21 \div 7 = 3$
6. Find the mode of the set of numbers: 1, 3, 1, 3, 1, 2, 3, 4, 4, 4, 1, 2  
Answer: Mode is 4

### R 3: Using averages

Look at the newspaper headlines and reports below. For each one, comment on why the use of the word 'average' is misleading.

#### **Hedon United spend an average of twice as much on each new player!**

Over the last few weeks both Hedon United and Paull Town have bought new players but Hedon United have spent an average of £4 million whereas Paull Town have spent a mere £2 million on average.

The most expensive player was Tim Wall who cost Hedon United £13 million – their other three new signings cost £1 million each. Paull Town, on the other hand, paid between £1.5 million and £3 million for each of their new players.

#### **Teenagers lose out to parents!**

Sixteen-year-olds make fewer calls on their mobile phones than their parents. In a survey of a group of 10 teenagers and their parents, it turned out that the average number of calls made by the teenagers the previous day was 5.3. The number of calls they made ranged from three to seven.

However the dads who were asked made an average of 6.5 calls, even though nine of the ten dads questioned admitted they had not used their phone the previous day. Mr Ingram, one of the dads, revealed that he made a massive 65 calls. He explained that he used his phone as part of his job.

#### **All children have a right to be above average**

Schools should ensure that no child is below average in maths and English, said the shadow spokesperson on education at a meeting of head teachers today.

## R 4: Which is better?

Look at the sets of charts below.

For each set, decide whether Chart A or Chart B gives a better representation of the data.

Make sure you give reasons for your choices.

### Set 1

Chart A

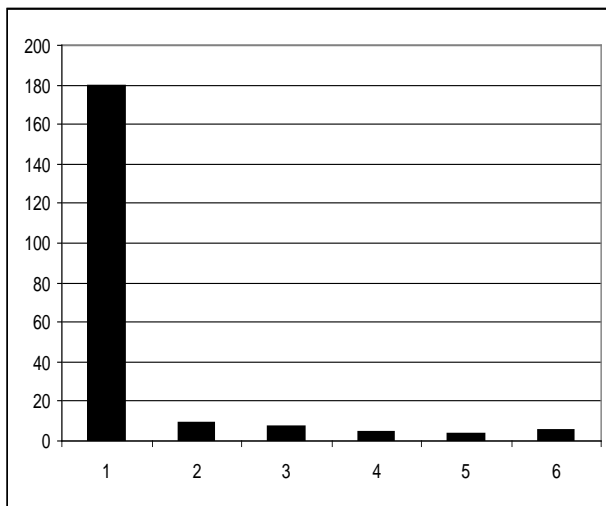
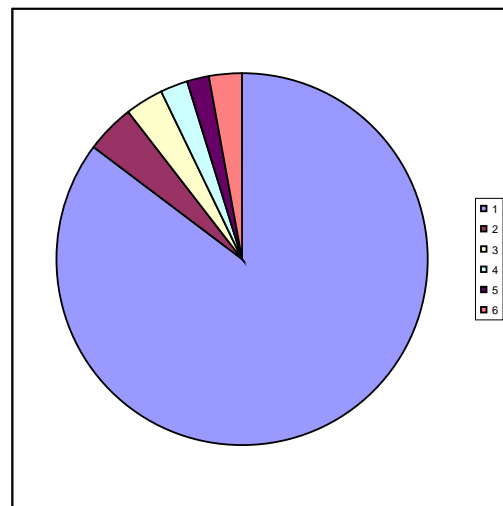


Chart B



### Set 2

Chart A

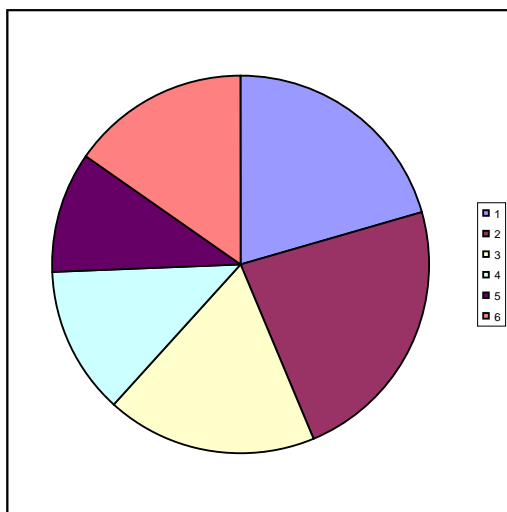
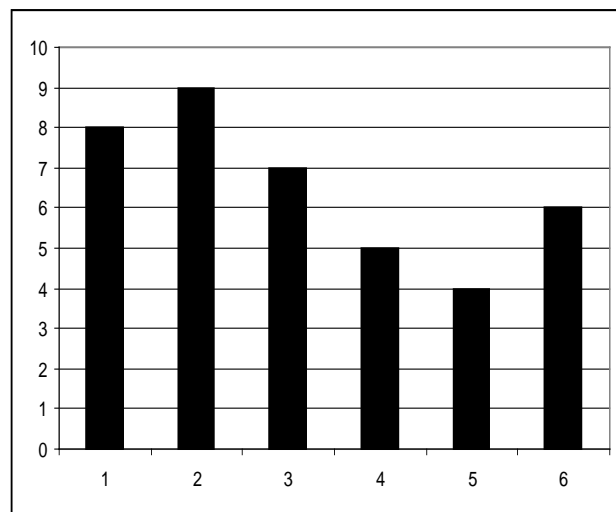


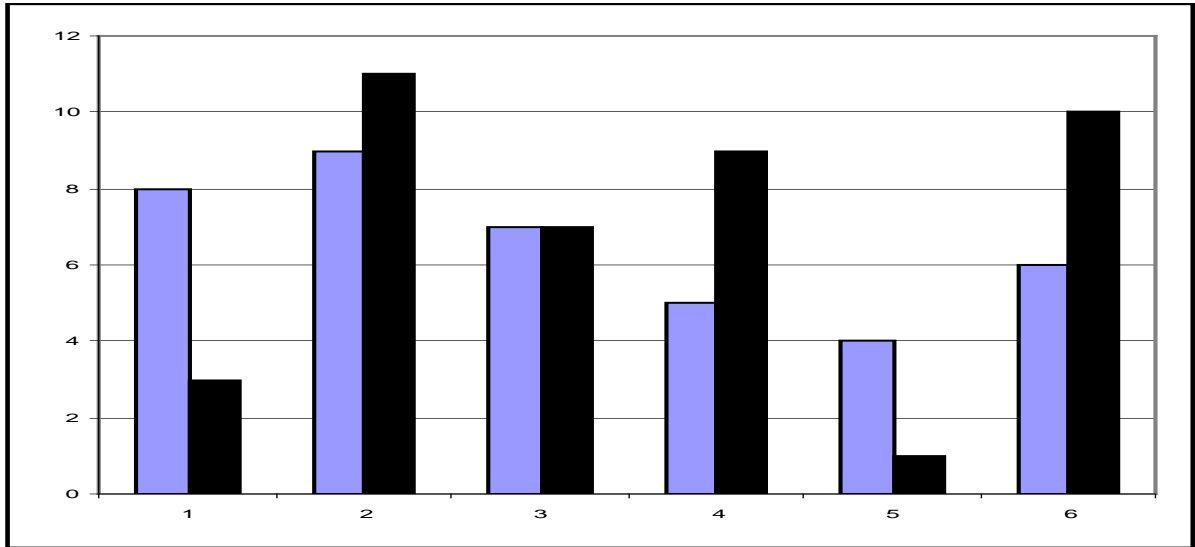
Chart B



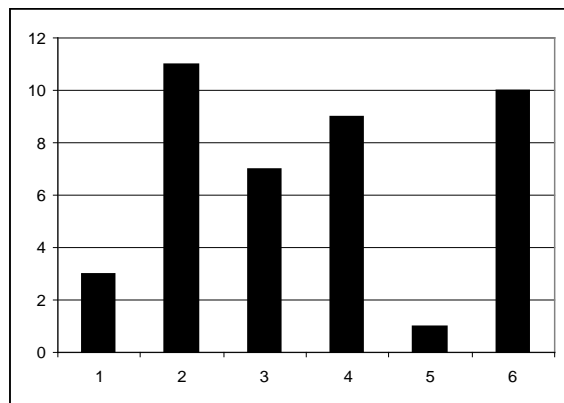
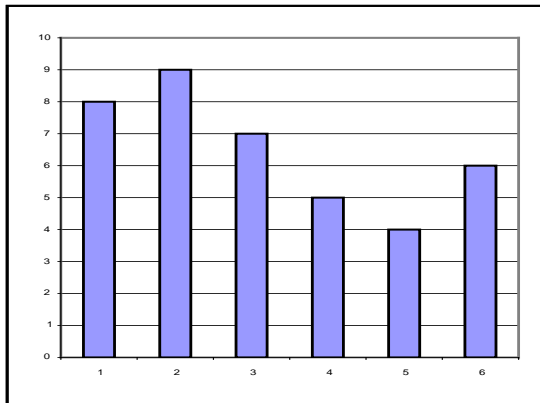


### Set 3

Chart A



Charts B



## **R 5: Labels**

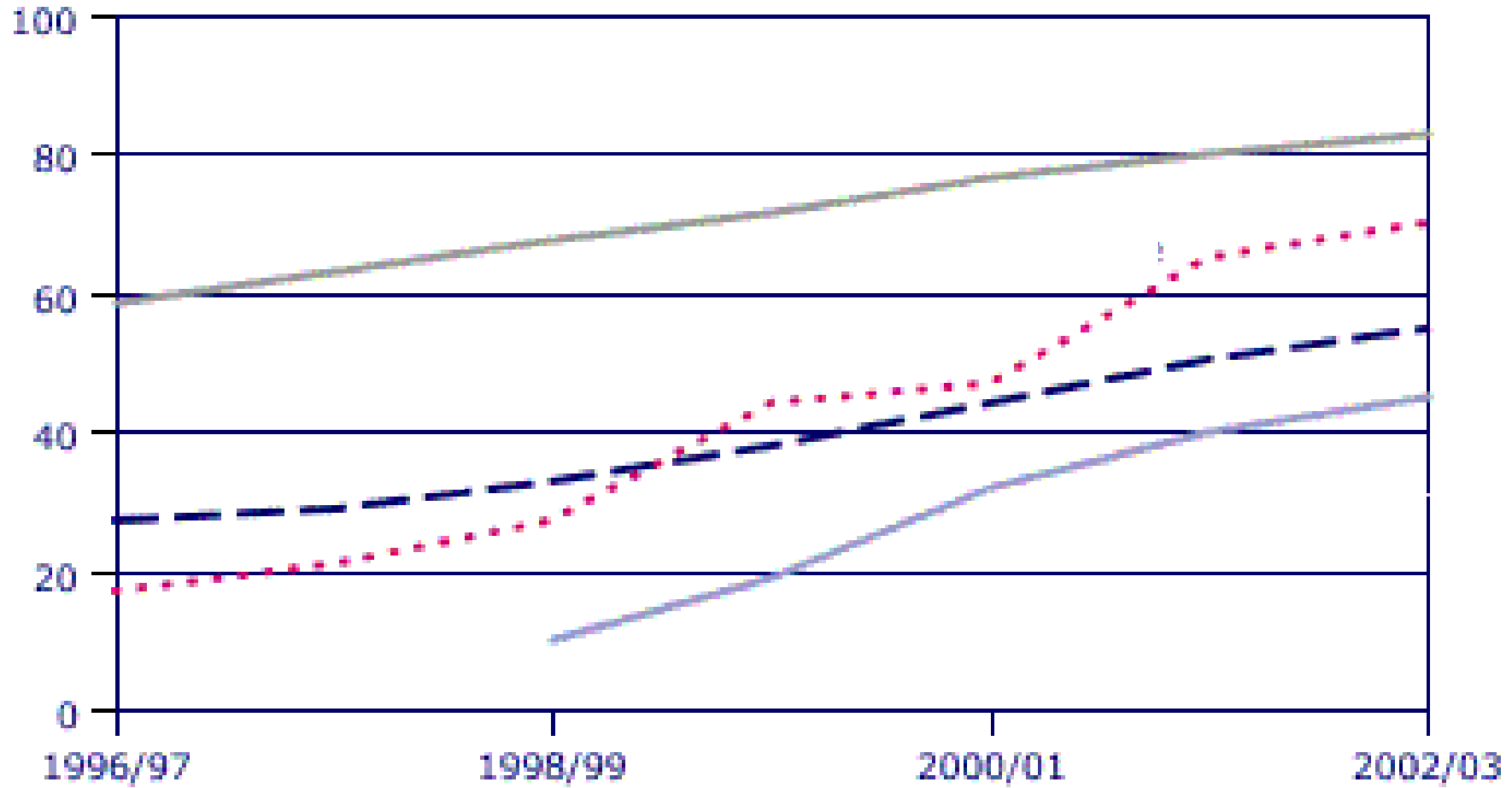
In groups, look at the two charts that you've been given. You will see that the labels are missing.

The labels are provided on the accompanying sets of cards. Match the labels to the appropriate part of each chart.

Don't forget to give reasons for your choices.

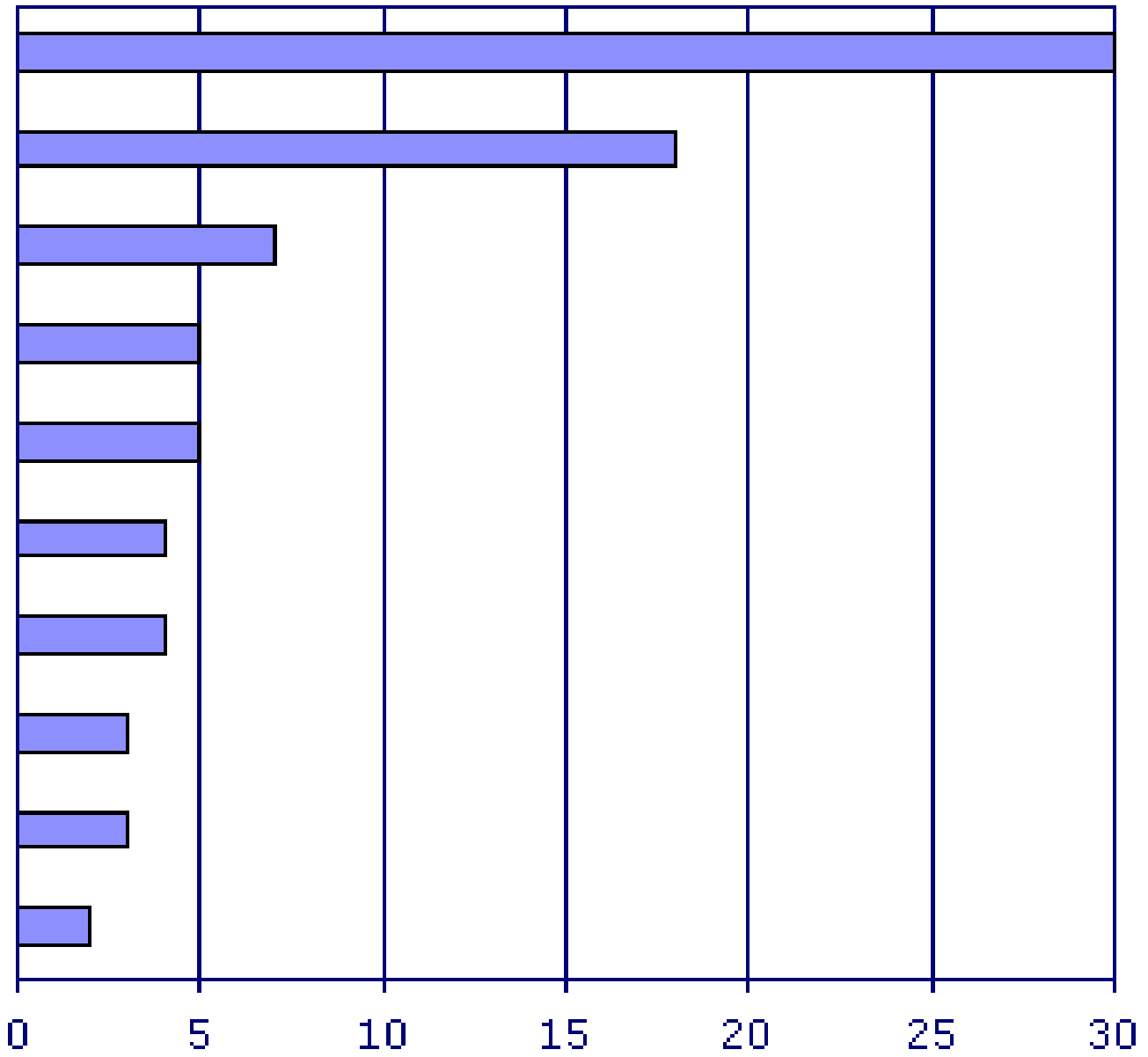
# Digital technology

Percentages



# Holiday destinations

Percentages



**Digital technologies**

<b>Internet access</b>	<b>CD player</b>	<b>Mobile phone</b>
<b>Digital TV</b>	<b>Home computer</b>	<b>DVD player</b>

**Holiday destinations**

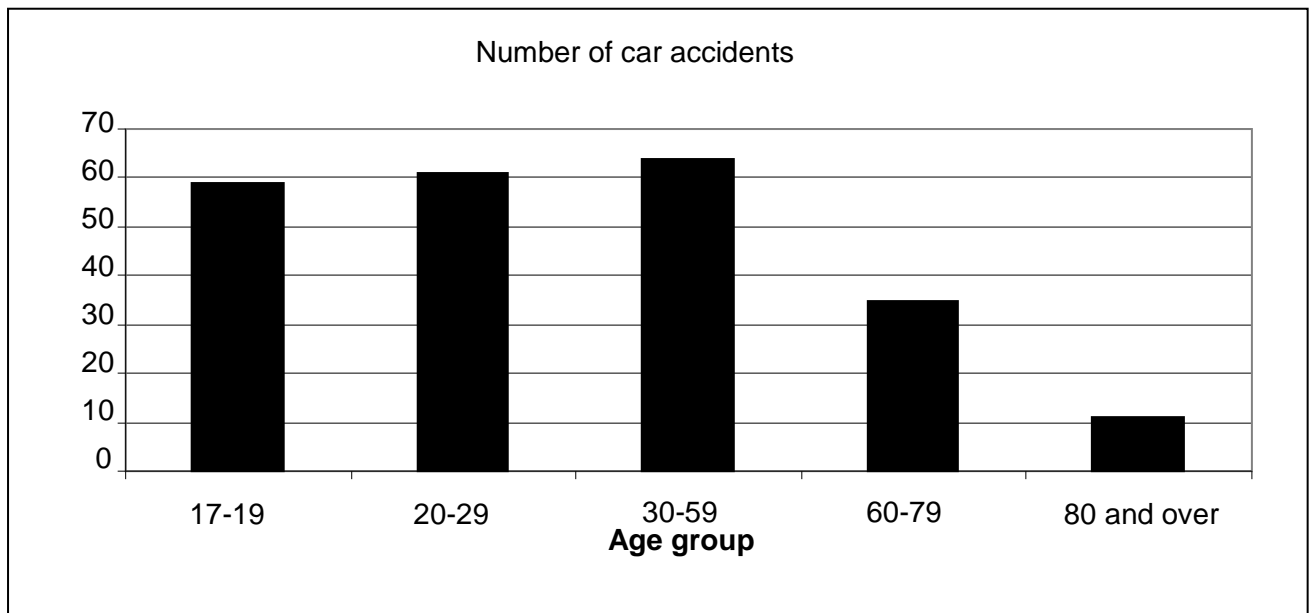
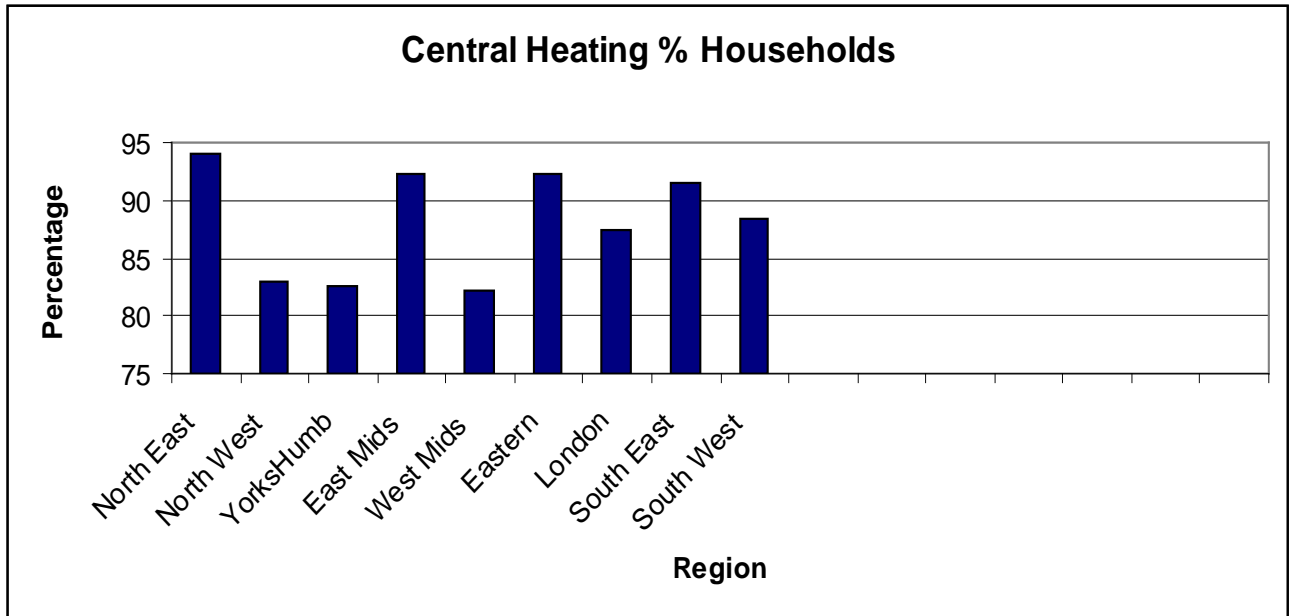
<b>Turkey</b>	<b>Portugal</b>	<b>France</b>
<b>USA</b>	<b>Netherlands</b>	<b>Italy</b>
<b>Ireland</b>	<b>Spain</b>	<b>Cyprus</b>
<b>Greece</b>		

## R 6: True or false?

Look at the two charts below.

In your group, decide whether each of the statements on the accompanying cards is true or false.

Give reasons for your decisions.



The safest drivers are those aged 80 and over.

17-19 year olds are safer drivers than those aged 20 to 59.

The 60-79 age group accounts for approximately 15% of all accidents.

30-59 year olds are the most dangerous drivers.

The percentage of households with central heating in the South East is twice that in Yorkshire and Humberside.

The difference between the South East and London is 5%.

More than three quarters of houses in the West Midlands have central heating.

## R 7: Clues

Below is a list of statements based on a chart about DVD rentals. In groups, use these statements as clues to help you to reconstruct the original chart.

When you have finished, compare your chart with that of another group. Is your chart the same? If not, why not? Are both charts equally valid?

1. *Comedy* was the most popular type of DVD with 33% of the rentals being in this category.
2. *Science fiction* was the least popular with only 4% of the rentals.
3. *Children's programmes* and *Horror* were only slightly more popular than *Science fiction*.
4. *Horror* had 3% more than *Science fiction*.
5. The *Thriller* and *Adventure* categories were second to *Comedy* but were a long way behind.
6. *Drama* accounted for 7% more of the rentals than *Horror* but 8% less than *Thriller*.