

Matematik

Lärarinformation

Självbedömning
Instruktioner (elev)
Berättelsen

ENGELSK VERSION

ÅRSKURS

3

Kontaktuppgifter

Frågor om utformningen av och innehållet i provet i matematik i årskurs 3 kan ställas till följande personer vid PRIM-gruppen vid Stockholms universitet:

Provansvarig Erica Aldenius, tfn: 08-1207 6613
erica.aldenius@mnd.su.se

Provutvecklare Heléne Sandström, tfn: 08-1207 6582
helene.sandstrom@mnd.su.se

Administratör Yvonne Emond, tfn: 08-1207 6575
yvonne.emond@mnd.su.se

Föreståndare Samuel Sollerman
samuel.sollerman@mnd.su.se

Frågor om provets genomförande kan ställas till Skolverket på följande adresser (frågorna besvaras så snart som möjligt):
nationellaprov@skolverket.se

Nationella prov
Skolverket
106 20 Stockholm

Tfn (upplysningstjänst och växel): 08-527 332 00

Frågor om beställningar och utskick av provmaterialet kan ställas till tryckeriet:

Exakta Print, tfn: 040-685 51 10
np.bestallning@exakta.se

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1. Genomförande av delprov A

Delprov A innehåller en muntlig uppgift som ska genomföras i grupper om 3–4 elever.

Tabell 3. Praktisk information

Delprov	Tidsåtgång	Material
Delprov A	Cirka 20–30 minuter per elevgrupp inklusive instruktioner	Underlag, utklippta föremål samt instruktioner

Beskrivning av delprovet

Nedan finns instruktioner för genomförandet av delprov A, som handlar om problemlösning och att resonera kring matematiska likheter och likhetstecknets betydelse.

Genom undervisningen i ämnet matematik ska eleverna sammanfattningsvis ges förutsättningar att utveckla sin förmåga att

- formulera och lösa problem med hjälp av matematik samt värdera valda strategier och metoder
- använda och analysera matematiska begrepp och samband mellan begrepp
- välja och använda lämpliga matematiskt metoder för att göra beräkningar och lösa rutinuppgifter
- föra och följa matematiska resonemang
- använda matematikens uttrycksformer för att samtala om, argumentera och redogöra för frågeställningar, beräkningar och slutsatser.

Uppgifterna kan hänföras till följande delar av kunskapskravet:

- Eleven kan lösa enkla problem i elevnära situationer genom att välja och använda någon strategi med viss anpassning till problemets karaktär. Eleven beskriver tillvägagångssätt och ger enkla omdömen om resultatens rimlighet.
- Eleven har grundläggande kunskaper om matematiska begrepp och visar det genom att använda dem i vanligt förekommande sammanhang på ett i huvudsak fungerande sätt. Eleven kan beskriva begreppens egenskaper med hjälp av symboler och konkret materialet eller bilder. Eleven kan även ge exempel på hur några begrepp relaterar till varandra.
- Eleven kan hantera enkla matematiska likheter och använder då likhetstecknet på ett fungerande sätt.
- Eleven kan beskriva och samtala om tillvägagångssätt på ett i huvudsak fungerande sätt och använder då konkret material, bilder, symboler och andra matematiska uttrycksformer med viss anpassning till sammanhanget. [...] Eleven kan föra och följa matematiska resonemang [...] genom att ställa och besvara frågor som i huvudsak hör till ämnet.

Organisation av genomförandet på skolan

Eleverna ska arbeta i grupper om 3–4 elever. Tänk igenom på vilket sätt grupperna sätts samman så att eleverna har störst möjlighet att visa sina kunskaper på bästa sätt. Utprövningar har visat att det är en fördel att i den här uppgiften sätta samman grupper av elever som är på liknande kunskapsnivå. Om läraren bedömer att det är lämpligare för någon elev att genomföra delprov A enskilt med läraren är det möjligt. Man bör dock vara medveten om att det kan begränsa elevens möjlighet att föra och följa resonemang.

För att kunna följa elevernas arbete bör du enbart observera en grupp åt gången. Bedömningsunderlaget finns som kopieringsunderlag i häftet *Bedömningsanvisningar*. Markera i underlaget för varje elev vad hon eller han visar. Använd ett bedömningsunderlag för varje grupp.

Som stöd för genomförandet av uppgiften och bedömningen av elevernas prestationer finns i häftet *Bedömningsanvisningar* kapitel 2, exempel på autentiska elevcitater inom respektive förmåga som avses att provas. Samtliga citat bedöms vara på en godtagbar nivå.

Det kan vara svårt att hinna med att skriva ned vad eleverna samtalar om, därför kan det vara bra att spela in elevernas samtal. Om det inte finns möjlighet att spela in är det viktigt att läraren under tiden eller direkt efteråt skriver ned vilket kunnande eleven visat. För att uppmuntra kommunikationen mellan eleverna och ge alla elever möjlighet att komma till tals, är det viktigt att följdfrågor ställs. Exempel på följdfrågor finns i detta häfte under *Genomförande vid provtillfället*. Det som ska sägas till eleverna står inom citationstecken.

I denna uppgift är det viktigaste att eleverna får möjlighet att kommunicera och resonera med varandra. Under tiden som eleverna diskuterar ska läraren observera dem för att få underlag till sin bedömning. Om en elev inte deltar eller får tillräckligt med talutrymme i gruppen är det viktigt att detta uppmärksammas och att en fråga riktas direkt till berörd elev.

Lärarens förberedelser

Innan delprovet genomförs bör läraren göra följande:

- Läsa igenom *Lärarinformation* samt *Bedömningsanvisningar* för delprov A.

En förutsättning för delprovets genomförande är att läraren är väl insatt i hur uppgiften ska genomföras och hur elevernas prestationer ska bedömas. Därför kan det vara lämpligt att pröva uppgiften tillsammans med kollegor innan delprovet genomförs med elever.

Till uppgiften behövs

- underlag ledtråd 1, 2, 3 och 4 (till del a), underlagen är märkta på baksidan
- underlag 5 (till del b)
- underlag föremålens värde, kopierade ett per grupp
- utklippta föremål: löv, kotte, pinne och sten (till del b)
- bedömningsunderlag, kopierade ett per grupp.

Underlag föremålens värde finns även som kopieringsunderlag ”Elevmaterial till delprov A” i kapitel 5 i häftet *Bedömningsanvisningar*.

På följande sidor finns genomförandet beskrivet. Dessa sidor kan med fördel kopieras för att ha med som stöd vid genomförandet.

Genomförande vid provtillfället

Introduktion till elevmaterialet

“In this task you will work together, you will reason out and discuss with each other. To reason out and discuss means that you should think aloud together, explain how you think and explain why. It is important that everyone in the group participates and that you demonstrate your knowledge of mathematics.”

Del a)

1. “Your task is to solve a problem together. You must find out how much several objects are worth. The objects are leaf, cone, stick and stone. You will get four clues to help you.”
2. Dela ut underlag ledtråd 1 till en elev. Be eleven beskriva ledtråden för de andra eleverna och sedan lägga ledtråden på bordet så att alla elever kan se den. “Can you describe what you see in this clue?”
Fortsätt på samma sätt med ledtråd 2 till nästa elev och så vidare med ledtråd 3 och 4.
3. Lägg underlag föremålens värde och en penna på bordet.
“This might be helpful when you solve the problem.”
4. “So you are supposed to find out how much a leaf, a cone, a stick and a stone is worth. Now it is you who have to discuss and reason it out together and I am going to listen.”
Låt eleverna börja diskutera och resonera med varandra.

När eleverna är färdiga får de kontrollera att deras gemensamma svar stämmer genom att var och en av eleverna prövar om ”deras” ledtråd går att lösa.

“Can you test whether your joint answer is in line with your clue?”

Föremålen kommer att ha samma värde i del b som i del a. Observera att om eleverna inte har kommit fram till rätt värden efter den gemensamma kontrollen behöver läraren hjälpa dem rätt.

Del b)

Lägg ut underlag 5 så att alla elever kan se det.

5. “Here, x is used instead of one object and y instead of another object. Your task is to find out which object x stands for and which object y stands for.”

Om eleverna behöver kan de använda de utklippta föremålen för att ersätta (täcka över) x och y när de arbetar med att lösa uppgiften.

Exempel på följdfrågor att ställa för att uppmuntra kommunikation och för att få eleverna att utveckla sina resonemang:

- Can you describe how you are thinking?
- How can you know that?
- Why?
- Can you repeat what was said?
- Can you explain to the others?
- Does anyone disagree?
- Which clue is best to start with?
- What does the equals sign mean?
- How many cones is *one* leaf worth?
- What is *one* cone worth?
- What was the value of the leaf in the previous clue?

Om mer underlag för bedömning behövs finns följande frågor att använda:

- Do you think it is possible to solve the task if the leaf (cone, stick, stone) changes value between the clues?
- Why can't you start with this clue (Underlag ledtråd 1) when solving the task?

Bedömning av delprovet

För bedömningen av elevernas prestationer på delprovet finns det röda häftet *Bedömningsanvisningar*. Detta delas ut till läraren när provmaterialet kommer till skolan.

The Story – The school playground

Introduction

It all started at a pupil council meeting at Nova and Troj's school.

Nova and Troj are class representatives. Playtime and the school playground have been the subject of discussion on several occasions in many of the classes. The pupil council decided that it was time to discuss them further, as well as what to do about all the points the pupils had raised.

In some classes, the pupils had mentioned that they thought the playground should be more fun and that there should be more to do during playtime.

In some classes, the pupils had also mentioned that they wanted more lessons outdoors.

The pupil council decided that they would send some pupils to talk to the principal about all of the ideas for the playground. Nova and Troj were the ones chosen to ask for a meeting.

They go to the principal. The door is open and the principal is sitting at her desk and typing on the computer. Troj cautiously knocks on the inside of the door.

"Hello, Ingela," he says.

The principal looks up and smiles when she catches sight of the children.

"Well hello, Nova and Troj, come in!" she says.

"Can you spare a little time?" asks Nova inquisitively.

"Absolutely, I actually needed a little break from all of the calculations," she says, sighing.

"What calculations, what is it you are calculating?" enquires Troj. "Do you have to do calculations when you are a principal? I just thought a principal made decisions and went to a lot of meetings all the time."

"Oh yes," the principal sighs. "Money, money and more money, I have to do calculations all the time. But, how can I help you?" she continues.

"We would need to talk to you about something," says Nova.

"Ooh, I do hope it's not as serious as it sounds," says the principal enquiringly.

"No, perhaps not serious, but important. It comes from the pupil council," Nova continues.

They tell her about what was discussed at the pupil council meeting. The principal says there is not much money available to spend, but promises she will think about how they can reach a solution.

"Meanwhile, I'll give you a task to take back with you to discuss with the others in the pupil council," says the principal. "I would like you to come up with a good idea for how we can keep better track of all the things used during playtime. I think there are far too many things that go missing. It is important that we take care of the things that we share together and make sure that they find their way back into the games shed."

Nova and Troj promise that they will come up with a plan and will talk with the others in the pupil council.

“Let me think a little about what we can do,” says the principal. “Everything can’t happen all at once, we’ll probably have to take it a bit at a time. I’ll talk to both the parents’ association and the teachers, I promise. Now I suppose I’ll have to get back to the money calculations, and you have a lesson soon, right?”

Nova and Troj feel quite satisfied and think that at least something might happen about the wishes of the pupils.

Part B

The pupil council holds a new meeting. Nova and Troj go through what the principal said to them and what she wanted the pupils to think about and make suggestions for. They talk for some time about how they can help keep track of everything they use during playtime so that things won’t go missing.

“I’ve got an idea!” says Troj after a while. “At my cousin’s school, pupils in the third grade usually act as playtime monitors, much like the teachers, although they call them ‘pupil monitors’. Surely we can have that here too? Everyone in the third grade can take turns at being one. Then they can help collect things after playtime so it’s not just the grown-ups who need to do it.”

“I think that’s a good idea!” says Nova. “It sounds fun to be a playtime monitor, at least if you take turns. I want to be able to play during playtime as well.”

They talk about Troj’s suggestion. They decide to suggest that the pupils in the third grade should take it in turns to be playtime monitors during playtime. They can do it in pairs, for example. Then they have the idea that they can write out a list of the things stored in the games shed. When playtime is over, the list can be checked off to see whether everything has been returned.

After the meeting, they go directly to the principal and talk about their suggestion. She thinks it’s a great idea and says she will talk to the teachers about it.

A few days later, Janos, who is Nova and Troj’s teacher, says that they have decided to try out the pupils’ suggestion for a while.

“As it was your suggestion, the two of you can start to act as playtime monitors today,” he says to Nova and Troj. “Here is a list of the things stored in the games shed, he continues. You can use it and then leave it on the door of the games shed afterwards.”

Nova and Troj take the list and leave to go out for playtime.

“Wait, something else!” Janos calls after them. “You can then stay outside after playtime. The whole class will try to do the long jump. You will need the measuring tape to measure with and a calculator. But I’ll bring them out to you later. See you after playtime!”

Part C

Tomorrow, there will only be lessons before lunch. After the lunch break it’s Activity Day, which the school celebrates once every year, when they are usually outdoors and have different play activities, games, competitions, face painting, dance, art exhibition, as well as a lot of other different activities. A little later in

the afternoon the pupils' families come and join in the celebration that continues right up to the evening. This year they have decided that everyone who wants to can play rounders in the meadow next to the school. All of the families will then have a picnic together there and eat the lunch packs they have brought with them.

The pupils have been preparing the activities for several days now.

"Oh, what fun it is that you celebrate Activity Day as well!" says Fatima. "We did at my previous school too. It was probably one of my favourite days," she continues.

"At my last school we celebrated it too!" says Karim.

Karim, Fatima and a few other pupils have joined the class in the third grade.

"Me and a few others used to make posters that we set up in different places around the school," Karim continues.

"But that's a great idea!" says Janos who heard what they were talking about. "Can you do something that we can set up? I think that would be great!"

"Okay," says Karim and straightaway goes to fetch some large drawing paper and crayons.

"How are we going manage to get everything ready for tomorrow?" asks Leonidas and sighs.

He and Nova sit down and write questions for the quiz walk. Troj prepares cans to put pencils in. A few other pupils create different play activities with balls and marbles. Some of them are outside in the playground making preparations.

"I really hope it will still be such good weather tomorrow too," says Nova.

"Yes, so it won't be like last year," laughs Troj. "Do you remember how much it rained? We had to have the quiz walk indoors in the corridors and all the games inside the sports hall. Although it was still quite fun to have the picnic in the sports hall and to eat our lunch packs sitting on blankets on the floor."

"I've heard that the parents will also have a meeting with the principal tomorrow evening," says Nova. "I think they will talk about what they can do with the playground and that we want a few more things to do during playtime."

Part D

At the start of the school day the wallboard says 'Find the Mathematics' in big letters.

"Today we are going to work with mathematics all morning," says Janos. "We will be both indoors and outside in the playground. You will work in pairs and I have written out here who will be working together, he continues, pointing to a long list on the wallboard."

"You will start by going out and looking for everything you can find in the playground that you think has something to do with mathematics. Take paper and a pencil and write down everything you find. But I'm not actually going to say any more than that for now," he continues with a bit of a cunning look.

Nova and Karim will work together. Nova turns to Karim and looks a little puzzled.

“Do you understand what we’re supposed to be doing?” she asks. “I don’t understand anything.”

“Yes, I think so,” he replies. “Come on, let’s go, I’ve had an idea where we can start.”

They go out to the playground and Karim points to the sandpit.

“Here, for example, I think there might be ... a million grains of sand,” he says. “Surely that could be mathematics?”

“Smart!” replies Nova. “Or perhaps it’s even billions!” she continues.

“Yes, we’ll take that!” says Karim, and writes billions of grains of sand on the paper.

Once they have written it down, they look around for more ideas.

“I’ve thought about something,” says Nova, pointing to the school house. “We can count all the windows on the school building.”

They walk around the entire school house and count, and count. They lose count several times and have to start again before agreeing on how many windows there are.

“Have you thought about something, Nova?” asks Karim. “The windows have different shapes too, surely we can write that down too?”

“Yes, and we can write down that you can measure the windows in different ways too,” replies Nova.

When Janos calls out that it’s time to come back in, they have a long list of things they’ve written down on their paper. When all of the pupils have returned to the classroom, they have to tell everyone what they have written down. Janos writes all the suggestions on the wallboard. It gets full up with everything the pupils have found.

“Wow, you found so many different things that can have something to do with mathematics!” he says. “I will save what you have written, so we can think of more tasks to go with them later. I notice that many of you found different geometric shapes both in the playground and on the school building. In fact, some of you also found a few new things hanging on the fence that have something to do with geometry. They were made by Lena, your handicraft teacher. She hung them up there early this morning.”

“Oh no, we missed them,” whispers Nova to Karim, and giggles.

“Geometry is exactly what we will continue to work with now,” says Janos, handing out the task booklets to everyone.

Part E

Today they have received a lot of new things to use during playtime. The parents’ association collected money to buy the things by selling cookies and other treats they had baked.

The school has received new marbles, new hula-hoops, and different types of balls. Not all of the balls will be stored in the games shed; some of them will be shared out among the classes.

In handcraft, the pupils who want to can sew useful bags to store the marbles in. During playtime, pupils can borrow a bag of marbles that they return to the games shed after playtime. There are many different marbles in the bags. Pupils can choose which bag they want to borrow.

“I think it’s most fun to start with a bag of only a few marbles,” says Leonidas. “It then gets more exciting to see how many I can win. So when I return the bag after playtime it might contain more marbles than when I borrowed it.”

“No, I think it’s most fun to borrow a bag of lots of marbles,” says Fatima. “Then I have more choice of which marbles I want to play with.”

A lot of pupils want to borrow the new things. It really is full speed ahead throughout the playground during this playtime. The pupils try to take turns and do different things, but some still quarrel and start complaining that it’s their turn, so the teachers have to help them sort it out.

Once playtime is over, all of the pupils run back indoors. The new skipping ropes are left in a large pile.

“Well, how cross this makes me! Look at this,” says Leonidas to Fatima and points to the pile of skipping ropes. “We should be keeping things organised, he continues. Otherwise, we might not get any more new things.”

“We’ll help one other so we can sort it out together,” says Fatima and unravels the skipping ropes one at a time as she counts them. “Do you remember how many skipping ropes there should be?”

“No I don’t, and now we’re going to be late just because we have to take care of this,” replies Leonidas moodily and helps Fatima to count the skipping ropes.

Leonidas is still a bit cross when they enter the classroom, but their teacher Janos still thinks it was good that they took care of the skipping ropes. He reminds the class that it is important for everyone to lend a hand by putting back what they borrowed.

“If any of you know that you forgot to return a skipping rope, you have Fatima and Leonidas to thank for taking care of it,” he says.

Part F

In the first lesson of the morning, Janos has a bit of a cunning look, as if he has a secret to tell. But he’s not telling what it is.

“Why are the blinds pulled down?” wonders Troj. “Are we going to watch a film?”

“Yes, we’ll be doing that shortly,” replies Janos. “First I thought that those of you who are now joining the class in the third grade should tell us a little about your previous schools. You can tell us a little about what the playground looked like, and what you did during playtime and in the lessons.”

The pupils who are new to the class tell everything possible about their previous schools. They think that some things are quite similar and some are different compared to this school.

Then it’s time to watch the film. It’s about schools in other countries. After the film, the class discusses what they thought was similar and what they thought was different when they compare it to their own school.

Outside, a lot of noise can be heard from the playground. It sounds like someone is banging with something. They also hear several voices, the principal's voice as well as a few others. Some of the pupils go to the window to watch.

"No, no stop right there!" says Janos firmly to them, but laughs a little at the same time. "What they are doing out there is a secret. You mustn't see it until playtime."

"Aha, that's why we had to have the blinds down and watch a film!" laughs Nova.

"Listen Nova," Troj says suddenly. "That sounded like your mother's voice."

But Nova doesn't seem to hear, everyone has started talking about what the secret might be that's happening outside in the playground.

"No, it can't be my mother," she says. "She went to work very early this morning. She had an important job that had to be finished today."

At last it's time for playtime and everyone is in a hurry to run out into the playground. Troj was right; it actually was Nova's mother's voice that he thought he had heard.

In the middle of the playground is a fairly large Earth globe. The principal, Nova's mother and a few others are standing next to it. Nova's mother is an artist and it turns out that the job she said was so important was to make an Earth globe for the playground.

All of the pupils are curious and go up to the globe, and look at it and feel it.

"Oh, feel here," says Troj, showing with his hand. "It feels like it's dented."

Nova's mother shows them and explains that what feels like little dents are mountains. Some of the mountains are high and some are a bit smaller. In some countries there are almost no mountains at all, and there it is quite flat.

"Then there must be a lot of mountains here in this country," says Nova, pointing to the globe. "Not so many here," she continues, pointing to another country.

Now everyone wants to feel the globe. A large ring of pupils forms around it and they want to go up and feel it.

The pupils think it's so pretty and that it's great to have an Earth globe in the playground.

"I'm standing here and I'm thinking about all of the lessons we could possibly have out here," says Janos, smiling at the principal. The principal nods and smiles back. She looks very happy.

Part G

"Look!" exclaims Troj. "There are the pre-schoolers, look at how small they are!"

He points out through the window where a group of pre-schoolers are standing with some adults.

"Surely we can't have been that small when we started here?" he giggles.

"Oh yes, you were all that small," laughs Janos.

Today is something they call Sponsor's Day at the school. The children starting

in pre-school class after the summer will be visiting the school all day.

“Now it’s important that we pull together to make it a great day for the pre-schoolers,” says Janos. “It should feel exciting for them to look forward to coming here when it’s time to start with us,” he continues. “You do remember what we did last year? We’ll be doing the same this year.”

Firstly, the pre-school children will be out playing in the playground without all the other pupils. Then everyone will be divided into groups with some pupils from the second grade and third grade together with pre-school children. The older pupils will be sponsors for the younger ones. First they will be in the playground and playing together, showing everything to do there. Then, after lunch, everyone will take a walk to the great children’s park close to the school:

“While the pre-schoolers are outside on their own, you will have a few other tasks to do in here,” says Janos and takes out a few things. “I’ve actually found my planning from when you were in the pre-school class,” he continues.

“I thought you should do exactly the same tasks again, so we’ll see if you remember what we worked on back then in mathematics,” he says and laughs.

There is a lot of laughing and giggling during the lesson. The pupils think that it’s fun to work with the same things they did when they were in the pre-school class.

“Imagine that I can remember finding this difficult,” says Nova and giggles. “It feels a bit strange now that it seems really easy.”

After lunch they walk to the children’s park. On the way there they walk past the swimming pool and the football field.

There are lots of things in the park that they don’t have in the school playground.

“I think the ball board and the dart board are the most fun,” says Troj. “Especially the ball board when we get to decide how many points are scored in the different holes.”

“Yes, I think so too,” nods Nova in agreement. “I think it’s fun when we decide to have slightly more difficult points, you know, that you can make up when you want to.”

When the Sponsor’s Day is over and they return to school, they notice in the playground that they’ve been given one more thing.

“Look we’ve got a dart board!” cries Troj, and he runs up to it. “What a piece of luck that the darts have magnets instead of tips. Otherwise, the pre-school class wouldn’t be allowed to use it. It would probably be a bit dangerous for the little ones, I think.”

“Hey, what do you mean? I’m actually not little anymore!” says little Michelle, who is Troj’s sponsored child and who holds onto his hand tightly.

“Not at all, you’re quite big now,” replies Troj smiling.

Conclusion

At the next meeting of the pupil council, the principal is present.

“Now I want to thank you all in the pupil council for doing such a good job for the school,” she says and smiles. “This is exactly how I think it should be,” she continues. “That you come and talk to me when you are wondering about something that we can do better, and that we try to solve it together with you, with the staff and with your parents.”

“Imagine that it was actually us the pupils who started it all so that we got an even better playground,” says Troj.

Then they talk for a while about what it has been like to be a playtime monitor at playtime and to help the adults who are outside for playtime to keep things organised. The pupils think it has worked well for the most part.

“It’s great that we could arrange a little more in the playground for you,” says the principal. “Now, of course, I think it’s not just about things. I quite often notice that you also play a lot of different fun games where you don’t need anything at all.”

The principal is also curious to know whether the pupils have had more lessons outside, which they had also wanted.

“Yes, in fact we have!” says Nova. “We’ve worked outside in many more different lessons than before. For example, we’ve never had English, handicraft or music outside before.”

“That sounds great!” says the principal and looks satisfied. “When I talked to the teachers, they thought it was fun that you wanted to work outside more often. They have actually suggested that we should do a few more things outside in the playground. Some of the parents have promised to paint some more things down on the ground in the playground.”

“That sounds exciting,” says Troj. “I wonder, what exactly might that be?”



2. Kopieringsunderlag

I det här kapitlet finns följande kopieringsunderlag att använda vid genomförandet av provet.

- Kopieringsunderlag 1: Self-assessment – Me and mathematics

Self-assessment – Me and mathematics

Colour the clouds
with the colour that
best matches how
you feel when you
are going to ...

green = sure
yellow = fairly sure
blue = not sure

... work out
something in
your head,
for example $20 - 13$

... solve a
math problem

... show how
many a third of
12 pupils is

Me and mathematics

... read a
bar graph

... use a written
method of
calculation

... know what has
the biggest area

... use
a calculator

... describe
and know the names
of geometrical objects

... show which
arithmetic operation
you are going to use
in your working

Namn: _____

